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IDA PAPER P-2023

RELATING PERSONNEL AND TRAINING RESOURCES TO UNIT PERFORMANCE:

Identifying Data on Performance in the Military

Colin P. Hammon
Stanley A. Horowitz

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September 1987

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INSTITUTE FOR DEFENSE ANALYSES

1801 N. Beauregard Street, Alexandria, Virginia 22311

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IDA Log No. HQ 87-32235

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REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS			
2a. SECURITY CLASSIFICATION AUTHORITY ~~DD Form 254 dated 1 October 1983~~		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited.			
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) IDA Paper P-2023		5. MONITORING ORGANIZATION REPORT NUMBER (S)			
6a. NAME OF PERFORMING ORGANIZATION Institute for Defense Analyses	6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION OSD, OUSDRE, DoD-IDA Management Office			
6b. ADDRESS (CITY, STATE, AND ZIP CODE) 1801 North Beauregard Street Alexandria, Virginia 22311		7b. ADDRESS (CITY, STATE, AND ZIP CODE) 1801 North Beauregard Street Alexandria, Virginia 22311			
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Office of the Assistant Secretary of Defense (Force Management and Personnel)	8b. OFFICE SYMBOL	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER MDA 903 84 C 0031			
8c. ADDRESS (City, State, and Zip Code) The Pentagon Washington, D.C. 20301		10. SOURCE OF FUNDING NUMBERS			
		PROGRAM ELEMENT	PROJECT NO.	TASK NO. T-L6-361	ACCESSION NO. WORK UNIT

11. TITLE (Include Security Classification)

Relating Personnel and Training Resources to Unit Performance: Identifying Data on Performance in the Military

12. PERSONAL AUTHOR(S).

Colin P. Hammon, Stanley A. Horowitz

13. TYPE OF REPORT Final	13b. TIME COVERED FROM May 1986 TO September 1987	14. DATE OF REPORT (Year, Month, Day) September 1987	15. PAGE COUNT 70

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Military performance, data, performance, personnel, training, readiness, training readiness, material readiness, operational readiness, proficiency

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Policies regarding manpower, personnel and training (MPT) in the military should be chosen according to the level of military performance associated with them. This requires that relationships between MPT policies and indicators of military performance be developed. Data on military performance are needed to develop such relationships. This paper identifies sources of information that could be used to link the characteristics of unit personnel with unit performance. A taxonomy for categorizing indicators of military performance is developed. The results of an investigation of data availability in all the services are presented, and the data are discussed. Suggestions are made concerning how to proceed in order both to advance the long-term goal of linking the characteristics and training of personnel to the performance of their units, and to gain valuable insights into the proper direction of policy in the shorter term.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT [X] UNCLASSIFIED/UNLIMITED ☐ SAME AS REPORT ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE (Include Area Code)	22C. OFFICE SYMBOL

DD FORM 1473, 84 MAR

IDA PAPER P-2023

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INSTITUTE FOR DEFENSE ANALYSES

PREFACE

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I. INTRODUCTION

A. BACKGROUND

This paper presents the results of research conducted in identifying existing data on personnel characteristics, training and, performance in the military Services. The end purpose is to link the characteristics of unit personnel with unit performance. Identifying these links would serve at least two critical functions: assessing manpower, personnel and training (MPT) policy options, and deriving measures of manpower capability from information on operational performance.

A sample of data bases covering the performance of military units and personnel, as well as the characteristics and training of people in the military are, categorized and analyzed in the paper. There are at least four reasons why we should know how the individual and aggregate characteristics of military personnel relate to their collective performance as a unit. These are to be able to:

- Decide who to enlist and retain, and in what numbers to enlist and retain them;
- Design better pay and retirement policies to compensate them;
- Design better personnel management (e.g., rotation and training) policies; and
- Develop aggregate indicators of the quality of military personnel.

Military planners and policy makers should be able to assess the results (outputs) of their plans and policies. They must also be able to demonstrate to the Congress that the output justifies the expenditure of resources. It is not enough to be able to show that more resources of a given kind produce more capability; good policy development requires assessment of how much capability is gained through alternative uses of the resources.

Much of the past analytic work in the manpower policy area has been concentrated on how to fill stated manpower requirements. This work needs to be continued, since DoD certainly should be concerned with efficiently getting the necessary people. However, statements of requirements often have been based on implicit and unverified assumptions about the required mixes of age, intelligence, education and experience. The requirements are derived with little explicit reference to how well other mixes might perform or to how

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much they might cost. Compensation and retirement policies are then designed to fill these requirements. For example, little attention is given to the possibility that senior people contribute so much in some settings that money could be saved and military capability increased by paying these people more and retaining more of them, while bringing in fewer recruits and reducing training costs. Under the current system, there is a tendency to focus on the fact that this action would result in overfilling requirements for senior personnel, leading to consideration of forcing some of them to leave in order to maintain a viable promotion plan.

At the same time, the retirement system has ' en reasonably efficient in achieving the level of post-20-year personnel implied by the Services' statements of requirements. However, an examination of units with more men of "post-retirement" age might show this level to be based on faulty assumptions. A performance-oriented approach to requirements might suggest further modifications to the retirement system that would allow it to serve better the real needs of the Services.

Another consideration is training. Considerable effort and expense go into the design and execution of training programs. Individual training programs are usually evaluated on the basis of individual test results, with some feedback from the field. Further follow-up that examines the performance of units, while controlling for specific training and other personnel characteristics, could give vital clues to people who design training courses and programs. Both schoolhouse and unit training would benefit from such examination.

Tying MPT policies to performance would not only lead to better MPT policies, but would help to justify them. When manpower, personnel and training resources can be linked to warfighting capability, their need and cost can be more easily compared with those of additional forces and modernization. This in turn should lead to more efficient and effective negotiations for budget dollars.

Building such links requires that three conditions hold:

- that data reflecting military performance exist;
- that such data be available for research purposes; and
- that analyses using these data to tie MPT policies to performance be successfully pursued.

This paper addresses the first two conditions, the existence and availability of relevant information on military performance.

Skepticism about the existence of the necessary data has been a considerable stumbling block to the kind of research under discussion. It has been noted that: "So difficult is measuring military effectiveness that some researchers believe it is futile to try."[1] The goal of this paper is to show that these researchers are wrong. All the Services go to considerable effort to develop indicators that are closely related to military effectiveness; these indicators are generally used for management purposes in the field. While many of them are not forwarded to higher headquarters, they do exist. Our objective is to list and describe a sample of these indicators: who uses them, how they are developed, what data elements they are developed from, what form they are kept in, and where they are kept. We hope to help dispel the belief that manpower policies cannot be developed and assessed in terms of their impact on the performance of military units.

Building the capability to develop and assess manpower policies in this way will not be easy. It will require a broad-based, bottom-up research effort. Relationships between the characteristics of people and collective performance are likely to differ by occupation and kind of equipment, so many different environments will have to be studied.[2] An extended effort will be needed, promising results in the early to mid 1990s.

B. PLAN OF THE STUDY

A taxonomy for categorizing indicators of military effectiveness is developed in Chapter II. The paper turns to its main work in Chapter III, listing and discussing such indicators. This chapter also includes information regarding the availability of data on the characteristics and training of personnel, since such data are just as important as are effectiveness measures for the kind of research we contemplate.

The final chapter suggests how to proceed in order both to advance the long-term goal of linking the characteristics and training of personnel to the performance of their units in a wide range of contexts, and to gain valuable insights in the shorter term.

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[1] Nicholas Bond Jr., *17th International Symposium on Applied Military Psychology*, (London: ONR, London Branch, U.S. Department of the Navy, July 1981).

[2] For evidence that relationships differ in this way, see Stanley A. Horowitz and Allan Sherman, *Crew Characteristics and Ship Condition*, CNS 1090, Center for Naval Analyses, March 1977.

II. FRAMEWORK DEVELOPMENT

As we are focusing on the determinants of military performance, our consideration of a framework for analysis begins by considering the prerequisites for unit warfighting capability.[3] Our approach is to start with the result and move one step at a time to the starting point, in terms of the flow from resources to capability. At each step the question is asked, "What do we need to get that?" By the end of the process the categories of resources that MPT policies are concerned with are reached and by retracing these steps, the links that must be forged to connect MPT policies with unit effectiveness are seen. Also evident are incremental steps that can be taken to make MPT decisions more output-oriented, even if the most difficult links remain unforged.

A. THE DETERMINANTS OF UNIT CAPABILITY

Unit capability depends upon the resources made available and what is done with those resources. In terms of accepted military definitions, a unit's capability is determined by its designed capability and its readiness. Readiness is the ability of a force, unit, weapon system or equipment to perform the mission for which it was organized or designed. Since MPT policy affects defense capability largely through its influence on readiness, the discussion will be concentrated on the determinants of readiness.

B. CATEGORIZATION OF READINESS

The standard treatment of readiness breaks overall readiness into four components: material, personnel, training, and supply readiness (see Figure 2-1). However, this taxonomy tends to mask complex interactions among the components of readiness. It perpetuates the incorrect notion that these are four parallel components that do not affect

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3   For a detailed discussion of a framework for decision making which includes a wider spectrum of war-fighting capability, see Stanley A. Horowitz, *Evaluating Navy Manpower, Personnel and Training Policies in Terms of Performance*, Institute for Defense Analyses, IDA Paper P-1919, March 1986.
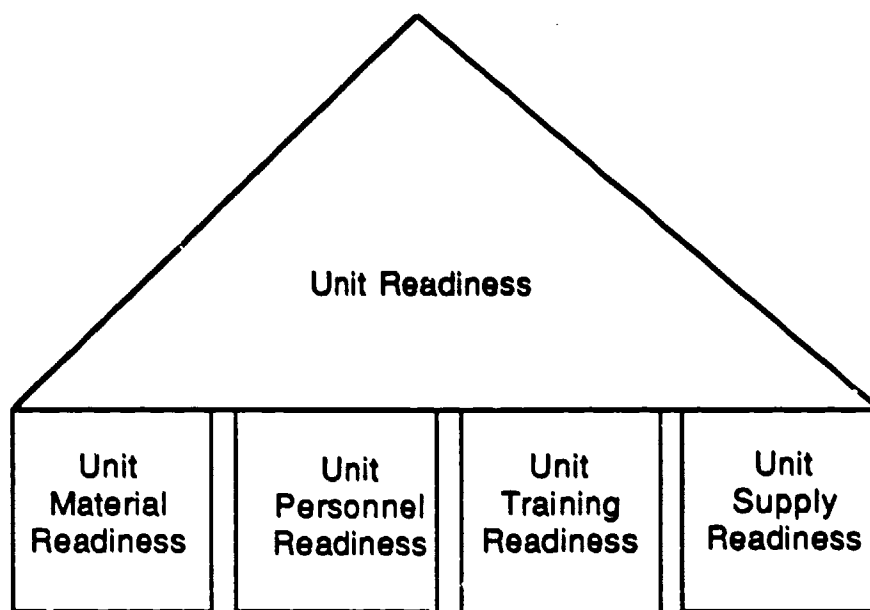
Figure 2-1. The Official View of Readiness--Four Pillars

each other. For example, the concept that having better people can result in better material readiness is not formally admitted to the structure; neither is the possibility considered that unit training can enhance the performance of individual tasks. The absence of such links severely limits the value of this structure as a framework to guide analysis.

As Figure 2-2 shows, three factors must be present for a unit to be ready for combat. Equipment must work -- material readiness must be high. The crew must be proficient in using the equipment in combat situations -- training readiness must be high. Finally, the necessary consumables -- fuel, ordnance and spare parts must be available -- supply readiness must be high. Personnel readiness -- the ability of the people assigned to a unit to perform their individual tasks -- underpins all of these factors. Effective supply personnel are critical to supply readiness and effective maintenance personnel are critical to material readiness. Good people are necessary to achieve the degree of training readiness needed for operational success.
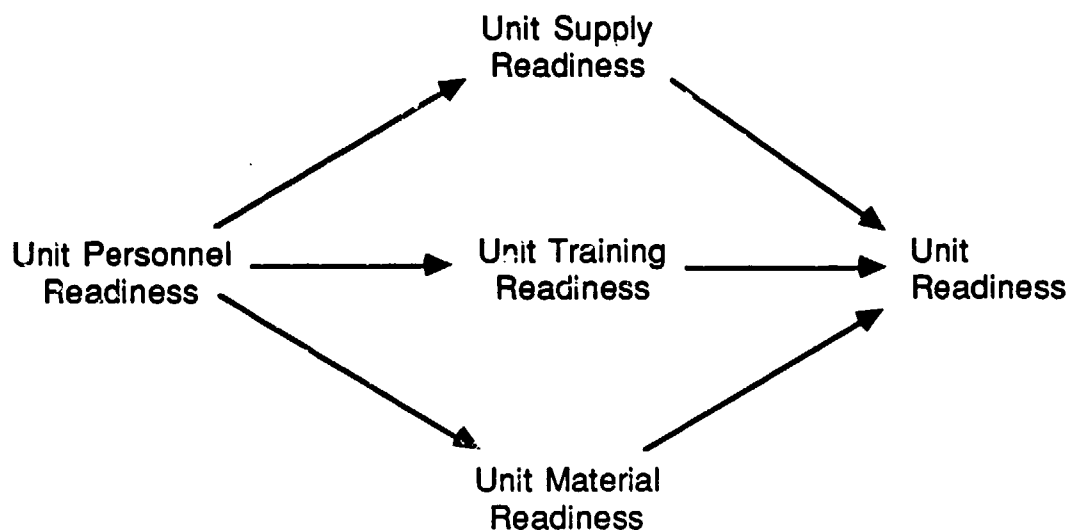
Figure 2-2. A Modified View of Readiness

C. PERSPECTIVES ON PERSONNEL READINESS

As shown in Figure 2-3, personnel readiness is at the heart of a complex network of interrelationships that underlies unit readiness. Effective personnel see to it that the necessary supplies are available. Material readiness is determined by equipment reliability and how long it takes to repair equipment when it is down. Reliability is usually taken to depend only on equipment design and the operating environment (including the tempo of training-related operations), but there are also personnel induced failures. These presumably reflect the level of personnel readiness and unit training. The speed of repair is dependent upon the availability of spare parts as well as the availability and ability of personnel -- on personnel readiness. Maintenance is, of course, a team effort. The speed of repair is therefore dependent not only on the quality and quantity of repair personnel, but also on their level of unit training.

The level of unit training is often assumed to be the only factor underlying training readiness -- that is, the ability of units to use their equipment effectively when it is working. It is reasonable to believe, however, that there is a trade-off between personnel readiness and unit training in the attainment of training readiness. Thus, it should be possible to achieve a given level of operating proficiency with fewer team skills if personnel readiness -- the quality and quantity of personnel -- is higher.

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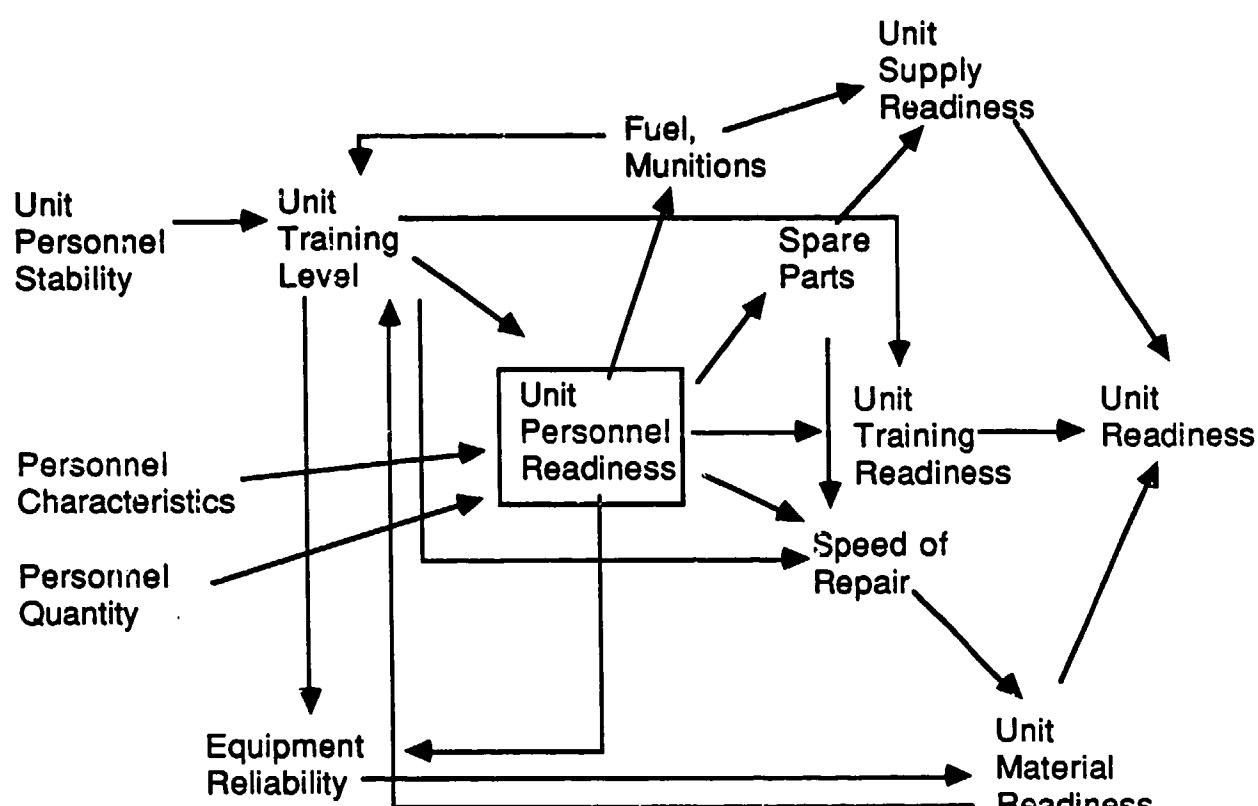
Figure 2-3. The Role of Personnel and Training in Producing Unit Readiness

The accomplishment of unit training can hone the performance of individual tasks at the same time it improves the performance of team tasks. The level of unit training, in turn, depends not only on how much unit training is done, but also on how much is needed. This is a function of personnel turnover, as well as the degree to which skills are perishable.

Personnel readiness -- how well people can do their individual jobs -- is influenced by the characteristics of personnel in the unit, the number of personnel, grade structure, unit and schoolhouse training, unit leadership and motivation. Personnel characteristics include what individuals entered the Service with, such as intelligence and education. They also include individual training, military experience and education acquired while in the Service.

D. DETERMINANTS OF PERSONNEL CHARACTERISTICS

Personnel characteristics include the measures of personnel quality most often used in judging the success of MPT policies: intelligence (mental group as measured by entry test scores), education level (the fraction who graduated from high school) and military experience (length of time in the Service). We are interested in expanding this list of measures of personnel quality and sharpening their definitions in order to get greater insight into the effect of MPT policies on performance. For example, time in service is one measure commonly used for military experience. Of course, time in service is only a proxy for certain work experience and the natural maturing process which takes place during a person's service. More useful measures of experience in a given instance might include such measures as flight hours, or time in a particular job or type of unit. A complete treatment of how personnel affect unit performance should also address characteristics such as motivation and leadership, which are determined by policies that are both internal and external to the unit.

These characteristics are the factors we want to use to quantify personnel quality. Some, such as motivation and leadership, are very difficult to measure. Data on others are readily available. The point is that personnel characteristics, along with unit training, can be statistically related to readiness and to unit performance in order to evaluate the effect of MPT policies on performance via their effect on the characteristics of personnel. MPT policies also can be linked to the kinds and amounts of resources expended. These links are shown in Figure 2-4, which extends the relationships described in Figure 2-3.

The policy instruments shown to the left in Figure 2-4 are in most cases straightforward. Recruiting practices, pay and allowances, retirement programs, rotation and quality of life policies influence who enlists and who is retained. Trainers, schools, rotation, fuel and spare parts affect operational and non-operational training, and experience. Fuel, spare parts and equipment affect supply and material readiness directly. At least some of these factors can be expected to affect motivation and unit personnel stability.

Of course, these policy instruments do not work independently of the national environment any more than they do of unit policies. Other things equal, fewer recruits will be attracted when entry-age cohorts are small, and more will be enlisted and retained when civilian job opportunities are poor. Such external factors should have (and have had) a
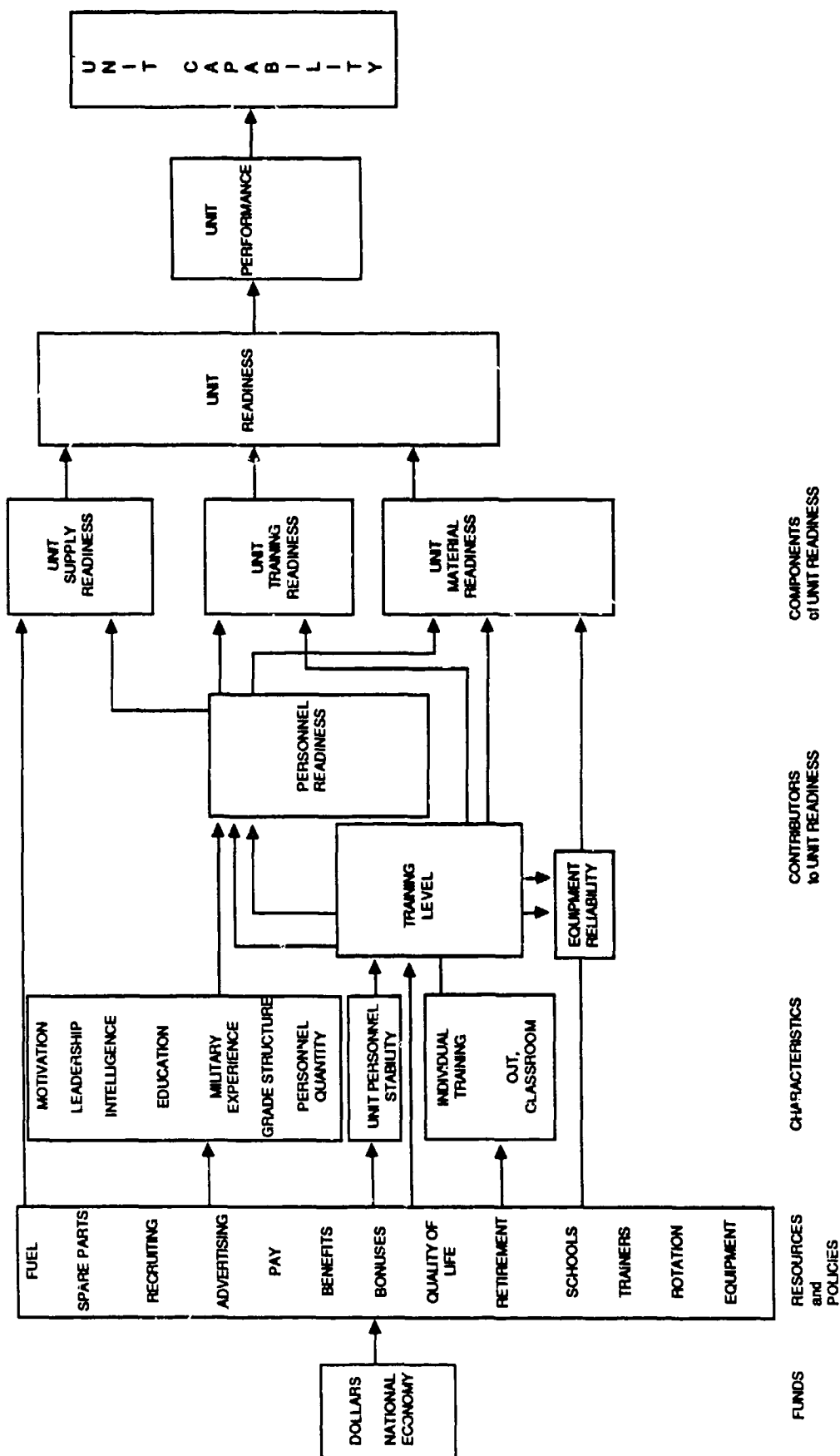
Figure 2-4. A Framework for Relating MPT Resource and Policy Decisions to Readiness and Capability

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prominent place in MPT policy analysis. However, the preponderance of MPT research has stopped short of extending the analyses beyond personnel characteristics and individual training. Instead, it is generally assumed that intelligence, education, training, personnel stability and experience are good, and more is better. This is true, but incomplete. Our primary interest is in the portion of the figure to the right of the policy instruments. We assume that certain personnel characteristics and individual training are obtainable at some price. The question is, what is their value in terms of military capability?

E. APPLICABILITY OF THE FRAMEWORK

Figure 2-4 suggests a methodology for evaluating MPT policies in broader terms than are typically considered.[4] While not all of the links hypothesized in Figure 2-4 have been quantified or substantiated in general, many of them have in particular cases. Our purpose is to show that the personnel characteristics and training variables can be empirically linked to unit performance. It would be desirable to trace the postulated relationships from resources, policies and personnel characteristics all the way through the various readiness measures to performance. This can be done in two ways: by quantifying all the intermediate links implied by Figure 2-4, or by relating resources, policies and characteristics directly to indicators of performance.

Accomplishment of our objective requires three things: an ability to develop quantitative indicators of individual and unit performance, an ability to match personnel characteristics and training with performance, and the resolve and resources to do the research to quantify the hypothesized links. Before embarking on any research effort it is important to establish that adequate data exist to support the effort. The next chapter lays out data requirements and reports our findings concerning the availability of such data.

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[4] The framework focuses on the MPT area. It could be expanded to address the contributions of all kinds of resources to military performance. This would facilitate cost effectiveness analyses that cut across the pillars of defense capability of the kind performed in S. Scott Sutton, *et. al., A Study of Aviation Resources and Readiness Relationships,* INS Study 32, Center for Naval Analyses, Alexandria, Virginia, June 1970.

III. SURVEY OF EXISTING DATA BASES

An analysis of the relationships between personnel characteristics and individual and unit performance requires accepted yardsticks to measure performance. This requirement does much to frustrate performance-oriented policy making. For the most part, policy makers do not have routine access to data on how well people do. The problem is not that the information does not exist, but that it is not generally available for policy analyses. It is collected for the purpose of decision making at disparate levels within the Services and in support of different objectives. Additionally, performance data are often considered privileged and dissemination may be tightly controlled.

The purpose of this chapter is to show that relevant data, including performance information, exist for a wide range of units, missions and tasks. Further, the chapter will demonstrate that these data often are used to evaluate the performance of people and units in an operational setting. While the scope of this study precludes an exhaustive treatment, an effort has been made to be as comprehensive as possible. In putting together a sample of data bases, we have concentrated on meeting the following criteria:

- Completeness

  - Availability of information on both personnel characteristics and performance

  - Coverage, in terms of the number of warfare areas within a Service, echelons within warfare area and time span treated

- Objectivity of performance data

- Usability

  - Degree and type of computerization

  - Potential accessibility for research.

The data bases can be characterized in several different ways. Tables A-1 through A-5, in Appendix A, list them by Service, locations (i.e., who holds them), format (automated or hard copy), warfare area, coverage, type of data (personnel characteristics, training or performance), objectivity, and relation to other data bases. Significant characteristics not included in the tables or needing amplification will be highlighted in the

discussion to follow. Availability for research purposes is not included as a category in the tables. In all cases the Service contacts made available the name of the agency to contact for access, and indicated the absence of a stated policy to withhold data which is suitable for research purposes. It is conjectured that the availability of data can only be determined on a case-by-case basis, contingent on specific research objectives.

In order to accomplish the type of analyses that we have addressed in this paper, three basic data types are required: (1) personnel characteristics, (2) individual and unit training and (3) performance. Availability of data of the three types will be discussed in turn, with the most attention being paid to performance.

Two principal categorizations of performance data are used. One distinguishes between maintenance performance and operational performance. The former focuses on whether equipment is working, the latter on how effectively it is used. The second categorization addresses the level to which performance is aggregated. Available performance data fall into three categories: that pertaining to individuals, performance at the crew, squad or system level, and information concerning the performance of command units (a command unit is an entity such as an aviation squadron, ship or battalion; these are generally units that can fight independently and that maintain detailed personnel and training records). · .

A. PERSONNEL CHARACTERISTICS

Personnel characteristics include name, Social Security Number (SSN), percentile scores on the Armed Forces Qualification Test (AFQT), education level, age, race, ethnic group, sex, grade, time in grade, time in service, occupation code, and special qualifications. These data are maintained in a comprehensive, automated data base by the Defense Manpower Data Center (DMDC). Time in unit is not included, but can be constructed by tracing back through successive records. The primary DMDC data base of interest is the Enlisted/Officer Master File, which covers all DoD military personnel. Time coverage is at six month intervals from June 1971 to June 1975 and quarterly thereafter. This data base also identifies the command to which each person is assigned.[5] This allows the records to be isolated for every individual in a given unit at the beginning of each quarter. By sorting on occupation, it is also possible to approximate the personnel

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[5] Unit Identification Code (UIC) for Army and Navy, Reporting Unit Code (RUC) for USMC, Personnel Account Symbol (PAS) for USAF.

structure by weapons system for some units; however, in general it is necessary to go to individual units (ship, squadron, battalion) to get the SSN information necessary to allow accurate characterization of individual and aggregate personnel characteristics by crew or other sub-UIC element.

B. TRAINING DATA BASES

Training data exist for every person in the Service, but unit-administered training information is frequently maintained only at the unit level. Each Service maintains automated personnel data files at their Headquarters Military Personnel Center. These data bases, which are the source for the DMDC files, include occupation and special qualifications codes in some form.

With the exception of the Army, records of attendance of basic and advanced individual training (Service schools) are maintained in these central files. The Navy tracks every trainee through each school attended, whether or not the course was successfully completed. Table A-1 lists the primary centralized and automated training data bases for the four Services.

Local training generally is not available above the level at which the Service record is kept (except for some flight training). This is the battalion level for Army, ship/squadron level for Navy, battalion/squadron level for the Marine Corps, and base level (squadron for some training) for Air Force.

In some cases, training data bases include information on performance.

1. Army

a. Enlisted Master File (EMF)/Officer Master File (OMF)

An automated version of each enlisted and officer service record is maintained at the Military Personnel Center, Personnel Information Directorate. However, not all the information kept in the official record is forwarded to MILPERSCEN for inclusion in the EMF/OMF. The OMF contains information on schools attended and records of assignment. The EMF contains Additional Skill Identifiers (ASIs) and Special Qualification Codes (SQCs), but does not show information about the school where the qualification was acquired. Grades for schools attended are not included in either of these files, nor are records of on-the-job training (OJT) or annual qualifications, such as weapons firing scores.

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b Training Management Control System (TMACS)

TMACS is an automated training reporting system in place worldwide and used at the battalion/brigade level. The system is used to report individual, crew and collective training. TMACS Training Event Codes (TECs) are aligned with those used by the Army's system of top-down resource allocation models and programs. These include:[6]

- Standards in Training Commission (STRAC),
- Flying Hour Program (FHP), and
- Operating Tempo (OPTEMPO).

The Army Readiness Training Evaluation Program (ARTEP), described in more detail in the performance section, states performance standards for particular tasks and conditions (environment). The purpose of STRAC is to concurrently specify training strategies and annual battalion training resources required for each individual, crew and unit to attain and sustain the ARTEP standards. STRAC allocates, in addition to ordnance and range time, simulators and devices such as small bore inserts. The Flying Hour Program is used to specify the quantities of flying hours, spares, and repair parts needed to meet training requirements at the individual, crew, unit and combined arms levels. OPTEMPO establishes requirements for operating tempo, and actual operating tempo is recorded in terms of vehicle miles and vehicle hours per time period.

Exercises such as live firing are periodically conducted for qualification. The scores can be compared with quantitative measures of training resources expended by the unit, as well as Army standards for resource usage. TMACS data therefore include both training and performance (as well as control) variables. The data are available at the battalion level as part of the TMACS data base.

2. Navy

a. Enlisted Master Record (EMR)/Officer Master Record (OMR)

The EMR/OMR files are essentially automated reproductions of the Navy Service Record, and are maintained by the Deputy Chief of Naval Operations (Manpower, Personnel & Training) (OP-012G). Assignment histories, including schools attended, are kept in these files, as is information on civilian education; unit training and OJT are not

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[6] These programs are discussed in some detail in "Linking Peacetime Training Resources to Wartime Combat Readiness," by Colonel Jack A., Pellicci, *Proceedings of the Symposium on the Military Value and Cost-Effectiveness of Training*, Brussels, Belgium, 7-9 January 1985.

included. These files are a quarterly snapshot of each person's official record and serve as the Navy source for the DMDC Enlisted/Officer Master Files.

b. Student Master File (SMF)

The SMF is generated by the Office of the Chief of Naval Training as part of the Navy Integrated Training & Resources Subsystem (NITRS). The SMF tracks all individuals (officer and enlisted) who attend a Navy school--when they started, length of attendance and whether they passed or failed. It does not include grades. The same information is also summarized by course in the Training Summary File. The information contained in the SMF is forwarded quarterly to the Center for Naval Analyses (CNA). CNA processes the enlisted data in order to make it more useful for research purposes and stores it in an automated file.

c. Naval Flight Information Reporting System (NAVFLIRS)

NAVFLIRS is an integrated aviation flight hour reporting system which was implemented on January 1, 1987. The system combines, in one automated data base, flight hour, logistics and maintenance information previously reported separately. Information contained in NAVFLIRS includes completion of flights and simulator periods that are part of the training syllabus, night/instrument hours, approaches and landings. Provision is made for recording completed ordnance training exercises, type of ordnance expended and scores: however, Navy units are not required to report this information. The data base is cumulative, so in addition to being able to obtain information on specific flights, data reflecting individual crew experience can be derived.

d. Maintenance Training Improvement Program (MTIP)

MTIP is an aviation training program which contains information on the proficiency of individual maintenance personnel. The MTIP data base uses the Aviation Training Support System (ATSS) computer network, which is widely accessible. All aviation type-wings on the east coast have access to ATSS and all have an MTIP program. The program is built around a data bank of questions which are sorted by aircraft type, system, and Navy Enlisted Classification Code (NEC). Written tests are given to all maintenance personnel periodically. When weaknesses show up, refresher courses are organized and taught by Technical Representatives and Naval Aviation Maintenance Training Detachment (NAMTD) instructors. The data base can be sorted by squadron, wing, type of aircraft, system, etc. Data for an individual include time since last course attendance, last test score,

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relative standing within squadron, wing, etc. The ATSS data base also includes school information other than the MTIP courses, as well as other personnel characteristics.

e. Type Commander Ship Employment Schedules

Operating tempo (the number of days at sea) is one measure of ship training accomplishment. Type Commanders issue detailed quarterly schedules for all the ships under their operational control. These schedules can be used to reconstruct operating tempo, using a system of over 400 distinct "employment terms" to describe the daily ship operations. These "employment terms" indicate training exercises conducted in port as well as at sea. At the end of each quarter, the schedules, marked up to show any deviations, are returned to the fleet commands, who forward them to the Total Force Fleet Operations and Readiness Division (OP-64) for retention.[7]

3. Marine Corps

a. Manpower Management System File

Officer and enlisted master files are arranged by SSN and Reporting Unit Code (RUC). The file is a quarterly snapshot maintained at Headquarters Marine Corps. The master automated service record files are maintained in Kansas City and are updated electronically by diary entries sent from the field. Current and the previous two assignments are shown with reporting and detachment dates. Up to eight schools are shown with dates of completion. Grades are not included in school information. The complete service record is maintained at the battalion/aviation squadron level, as is information on most OJT.

b. Flight Readiness Data System (FREDS)

FREDS was the forerunner of NAVFLIRS and is primarily of interest as a source of historical data. The USMC is currently a part of the NAVFLIRS, under a common management and data processing system. Marine units are required to report ordnance delivery performance data, as of January 1987.

c. Maintenance, Analysis, Training Management and Evaluation Program (MATMEP)

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[7] Linda C. Cavalluzzo, "OPTEMPO and Training Effectiveness,"*Proceedings of the Symposium on the Military Value and Cost Effectiveness of Training.* Brussels, Belgium, 7-9 January 1985.

MATMEP is the USMC equivalent of MTIP. The Marines are currently in the process of acquiring ATSS terminals and the system will be fully integrated with MTIP. Plans include expanding the system so that it can be used to track and coordinate all maintenance training and personnel resource allocation.

4. Air Force

a. Master Personnel File (MPF)

An automated service record file which covers both enlisted personnel and officers is located at the Air Force Military Personnel Center (AFMPC), Randolph AFB, Texas. The file contains assignment histories which include Service schools. Provision is made for the inclusion of grades, but this is not always filled in. Air Force Specialty Codes (AFSC), including prefixes and suffixes and the date the codes were acquired, are included; AFSC prefixes and suffixes indicate special skills and special equipment qualifications, respectively. PAS codes (unit identification codes) and SSNs also are included in the file.

b. HORIS Report

The HORIS data base is a centralized automated data base which is maintained at Air Staff Headquarters, Warrior Management (XOOTW). Current experience and training data are maintained for all active duty aircrew personnel. Information includes experience (total and by aircraft type) for greatest amount of time and two most recent aircraft, combat time, daily flight time and sorties in the last 30 days, etc. The information can be sorted on any one of eighty data fields. These data were used along with bombing scores in a recent USAF analysis of the effect of experience (total, type, mission) and number of evolutions on bombing performance.[8]

c. Air Force Operations Resource Management Systems (AFORMS)

AFORMS is a standardized reporting and data base system for training information. Its use is not required by all commands. The Tactical Air Command made it mandatory for wings in 1986. AFORMS is the input mechanism for the HORIS report. The data are more detailed than those summarized in the HORIS report, and where AFORMS is used it

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[8] Lt Col Thomas E. Cedel and Lt Col Ronald P. Fuchs, "An Analysis of Factors Affecting Pilot Proficiency," USAF Air Staff Analysis Branch, Washington, D.C., December 1986.

is a source of very detailed aviation training information. Additionally, many standardized AF forms, such as the Personnel Training Form, are entered into the AFORMS data base.

C. PERFORMANCE DATA BASES

In terms of the objectives of this study and the taxonomy developed in Chapter II, existing performance indicators sometimes approximate measures of unit capability; often as not they provide information more consistent with unit readiness, training readiness, material readiness or personnel readiness. In no case are they perfect. Their flaws should be borne in mind, but the decision whether or not to use them should depend not only on their imperfections, but also on the alternatives: the commonly used measures such as entry test scores, education, experience and pay grade mix, and operational activity that have a clearer tie to cost than to capability. The desire for perfection should not be allowed to preclude the possibility of substantial improvement.

1. Army

a. Army Readiness Training Evaluation Program (ARTEP)

ARTEP in itself is not a data base, however, it is the basis for essentially all Army unit training and performance evaluations. Data bases are created in complying with the reporting requirements of ARTEP, and in using and validating the programs and models that support it.

ARTEP provides a list of mission elements and sub-elements that each kind of unit (crew/squad through battalion) should be able to accomplish, along with standards for their accomplishment. These mission elements and standards are used by the unit commander to formulate unit training plans, and to track and evaluate the unit's performance and training readiness. Both internal and external evaluations are used as diagnostic tools for planning and executing unit training.

Internal and external ARTEP evaluations, along with individual and crew qualification scores, can be combined with training data from the Army's Enlisted and Officer Master Files (EMF/OMF), and personnel data available from either DMDC or Enlisted Records. The performance scores may not yet be available in automated form; the Army is procuring personal computers, but their use is not standardized.

Although individual and crew performance data have been used extensively for research purposes, external ARTEP evaluations have not. Ostensibly because the purpose

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of every evaluated evolution is to train and to qualify the participants, the Army is reluctant to make the results of external evaluations readily available to higher authority. The consensus seems to be that such use would degrade the integrity of the system and result in attempts to cover up rather than highlight and learn from deficiencies.

Regardless of the many objections to using ARTEP evaluations, they provide in many instances (particularly those evaluated by outside observers) relatively objective measures of unit performance. It is, of course, essential that the researcher be aware of the conditions under which the exercise was conducted and evaluated (seldom, if ever, are MPT analysts able to design an experiment with perfect controls and unambiguous cause-effect relationships). Despite the flaws in ARTEP evaluation data, analysts could reasonably expect to use them to identify systematic correlates of performance.

b. National Training Center (NTC)

The NTC is a large instrumented ground combat range located at Fort Irwin, California. Armored and mechanized battalion task forces train in live-fire and force-on-force engagements against a resident and well- trained opposing force. Exercises involve the combined operations of tanks, mechanized infantry, artillery, air defense, engineers, electronic warfare, nuclear, biological and chemical warfare, attack helicopters, and close air support aircraft.

NTC training consists of approximately eleven exercises, including offensive and defensive, day and night operations conducted over a twelve day period. The exercises are conducted without breaks and without outside support, so units are required to demonstrate full logistics capability, including maintenance, evacuation of casualties, and field billeting and messing.

Exercise data are obtained by monitoring radio transmissions, and by using one mountain-top and eight mobile video cameras; digital data are obtained from the Multiple Integrated Laser System (MILES). Soldiers and vehicles are equipped with sensors which register hits and near misses by laser beams which simulate weapons fire. Assessment of degree of damage and casualties inflicted by non-instrumented weapons, such as mines and grenades, are made by 126 observers who also make subjective performance judgments. The observers and NTC staff together conduct debriefings and prepare a comprehensive take-home package intended to assist the exercise units in correcting deficiencies after they leave the NTC.

An electronic clipboard currently under development is intended to improve the effectiveness of the observers. The clipboard is essentially a small computer which provides menu-driven information, and into which data can be fed using an electronic pencil. This device will make check lists and rules of engagement available to the observers nearly instantaneously.

The NTC, while potentially the most objective source of performance data for large ground warfare simulations, has not been exploited to build a comprehensive data base. The NTC Analysis Division of the Center for Army Lessons Learned (CALL) is responsible for collection and analysis of NTC data. CALL, located at Fort Leavenworth, publishes a monthly "Lessons Learned" newsletter based primarily on NTC observations and discussions with the NTC Operations Division, members of the Opposing Force and Unit Commanders. The newsletters examined by the authors do not contain any reference to actual events or units. The reasons for this appear to be both technical and doctrinal. On the technical side, the MILES coverage does not include all troops, air defense/aviation units or nuclear/chemical warfare; neither does MILES always penetrate smoke and dust generated on the battlefield, nor will it reach units masked by terrain.[9] Additionally, the observer/trainers may actually affect the outcome of the exercises in their efforts to stimulate action and enhance training.[10] The quality of the data is therefore considered suspect by some.

On the doctrinal side, the DoD, in responding to a GAO finding that the "lack of reliable objective data precludes Army-wide assessments", stated that the primary mission for the NTC is training.[11] As stated above, it is apparently the Army position that too much emphasis on objective data could be detrimental to that mission.

Despite this, it is clear that the Army is taking action to increase the role of the NTC as a source of objective data. The scope of MILES is being expanded to include indirect fire and air defense/aviation and nuclear/chemical play, which involves new software and expanded computer capacity.[12] Additionally, the Army has tasked ARI to begin "...developing objective data requirements, a methodology for the use of NTC findings in

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[9] Discussions with Jack Hiller, Director, Training Research Laboratory, Army Research Institute.

[10] Ibid.

[11] General Accounting Office, Army Training, National Training Center's Potential Has Not Been Realized, GAO/NSIAD-86-130; July 1986, pp. 25-26.

[12] Ibid. p. 26.

doctrine, organization, equipment, and training development, and methods for continuing to improve the utility and quality of NTC data."[13] As part of this research, ARI is defining additional unit performance measures using the ARTEP scoring scale, a necessary step if the NTC is to realize its potential as a source of objective performance data.

c. Crew/squad Level Performance Data

Crew evaluations are conducted throughout the Army. Every unit conducts crew/squad training in accordance with requirements for specific qualifications. This training also provides many of the validation exercises conducted in support of the Battalion Level Training Model (BLTM) Program. The BLTM, which uses STRAC and OPTEMPO standards, is intended to relate training activities to the level of training readiness based on the frequency of execution needed to sustain various levels of training readiness.[14] Exercises also are conducted as formal studies by Army Research Laboratories in order to update BLTM, OPTEMPO and STRAC models and standards.

Weapons crews/squads conduct attainment and sustainment events throughout the training cycle. Attainment events are graded exercises conducted for qualification; sustainment events represent day-to-day practice and are intended to build and maintain proficiency. Riflemen qualify both individually and collectively as part of a squad. Weapons crews qualify individually and collectively as well. These events exercise the crew in those evolutions necessary for each required mission. Generally, simulators are used to the maximum extent possible for sustainment, and attainment events are live firing exercises. For weapons which fire very expensive ordnance (e.g., TOW missile) simulators may be used for attainment. Records of attainment event scores are kept at battalion headquarters, usually in an automated file whereas sustainment event data are kept in non-standard hard copy format. However, a prototype automated system called the Integrated Training Management System (ITMS) exists at one base. The ITMS will provide records of resources expended by each crew as well as attainment event performance. In general the battalion is the highest level at which complete data sets exist, since personnel characteristics and training data are also kept at that level. However, information about some individual OJT training may be obtainable only at the company level.

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13 *Ibid. p. 27.*

14 op.cit.; Col Jack A. Pellicci, pg. 334

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In addition to regular battalion-level training exercises, the Army conducts an extensive research program aimed at evaluating the effectiveness of new systems and updating the various resource models as new equipment is introduced. One such study analyzed the effect of simulator training on M1 tank-firing exercises. Six battalions participated. All but one battalion conducted a specified number of simulator firings in addition to a specified number of preparatory live firings. Each battalion then fired (and was graded) on the same range under approximately the same conditions. In addition to their primary objective, such studies can be a source of unusually accurate performance data. The researcher is usually on site when the data are collected and may be able to specify what data are to be recorded. The unit commander is interested in qualifying crews, not necessarily in whether they qualify on the first attempt. Unless recording rules are specified in advance, failures prior to attaining a qualifying score may not be recorded. Consequently, performance data from the unit training data base may be difficult to interpret.

d. Individual Training Evaluation Program (ITEP)

ITEP applies to every soldier in skill levels 1-4 (E-7 and below), active, reserve and National Guard. The purposes are to:

- evaluate proficiency,
- promote standardization of individual training,
- serve as a basis for collective training plans,
- provide training feedback to commanders and MOS proponents, and
- provide objective indicators of MOS-task proficiency for use in career planning.

Three methods for evaluating individual performance are used. These are (in order of decreasing objectivity) the Skill Qualification Test (SQT), Common Task Test (CTT) and Commanders Evaluation. The SQT is a written test designed to evaluate and compare soldiers in the same MOS and skill level across the Army. Scores are maintained in an automated data file at HQDA Military Personnel Center (MILPERSCEN) and at Enlisted Records, Fort Benjamin Harrison, Indiana. The CTT is a hands-on test designed to measure combat and survival skills common to all MOS's. The test is administered to all skill level 1-4 personnel at least once each year. It may be taken by E-8/E-9 personnel and officers at their discretion. The test is scored pass/fail and is repeated until passed. However, the number of skill areas (out of a total of 17) passed on the first attempt is

recorded. Commanders' evaluations are administered internally in a variety of training situations and cover both MOS-specific and common skills. Commanders' evaluations are also made as spot checks during external ARTEP evaluations.

An Army wide automated ITEP data base, the Enlisted Master File, is maintained at the Army Training Support Center, Fort Eustis, Virginia. Test results are also sent to the individual, unit commander, Enlisted Records and MILPERSCEN.

2. Navy

a. Surface Training and Competitive Cycles

Training plans and inspections for surface ships and submarines are based on their regular overhaul (ROH) and deployment cycles. On completion of an overhaul, or Post Shakedown Availability (PSA) for a new ship, a ship goes through a period of basic training and general orientation. This basic phase is followed by Underway Refresher Training (RFT), an intensive training period conducted under the supervision of the Fleet Training Group/Unit. During the six to ten weeks of RFT, the ship is exercised in every mission and system, culminating in a major Battle Problem. Numerical scores for these exercises (called Standard Readiness Requirements) and the Battle Problem are recorded and reported to the participating ship and the administrative squadron commander. These evolutions are scored using subjective as well as objective criteria however, they are scored at approximately the same point in the training cycle and each ship of the same type is graded by the same team of inspectors. Overall performance scores are reported to and retained by the administrative squadron commander. Detailed scores for each evolution, which reflect sub-element (division) performance for many evolutions, are retained by the Fleet Training Group on hard copy. These are not centralized in a readily retrievable data base.

Following RFT, each ship completes scheduled exercises at sea and in port, in preparation for deployment. Training exercises (TRXs) and inspections are geared to bringing the ship to a high level of readiness and maintaining this level throughout the deployment. During the deployment and inter-deployment periods the ship completes TRXs with a prescribed frequency. It also undergoes certain inspections which contribute to its ranking for battle efficiency/excellence awards.

Superimposed on the training cycle is a competitive (award) cycle, usually of 18 months duration. In addition to the overall Battle Efficiency "E", given to the best ship of

each ship type in every squadron, excellence awards are given for each warfare mission area as well as certain non-mission categories. Awards are given for Anti-Submarine Warfare (ASW), Anti-Air Warfare (AAW), Anti-Surface Warfare (ASU), Command, Control and Communications (CCC), Mobility (MOB), Fleet Support (LOG/FSO), Electronic Warfare (ELW), Mine Warfare (MIW), Amphibious Warfare (AMW), Supply, Damage Control, Navigation/Seamanship, Aviation Intermediate Maintenance and Retention. Although the overall excellence awards are not particularly good candidates as performance measures because of the small number of ships that earn them, the more broadly distributed mission (and non-mission) area awards are. In addition, some of the scored evolutions--which make up the measures on which awards are based--are potential sources of objective performance data.

(i) Selected Exercises (SELEXs)

Some TRXs are performed only once between overhauls, while others must be repeated more often. SELEXs are a subset of the TRXs which are repeated at prescribed intervals and graded by outside observers. They also must be repeated at least once each competitive cycle, and scores entered into the ship's ranking for "E" nominations. SELEXs cover all primary missions. They include AAW and gunfire support live firing, ASW exercises, and damage control and propulsion plant (mobility) exercises. The exercises themselves are the same as many of those performed during Underway Refresher Training and may be accomplished during RFT, or between deployments, during a shorter period at the Fleet Training Group called an Interim Underway Refresher Training (IRFT). When accomplished during RFT/IRFT, the detailed grade sheets are retained by the Fleet Training Group.

(ii) Training Inspections

Reported unit readiness, commanding officer evaluations, and awards are based on various inspections given throughout the training and competitive cycles. In general, results of these inspections are reported to the administrative squadron commander with summary reports going to the type commander. Since February 1987, inspection results and the date training exercises are completed have been maintained in a centralized automated data base. However, this data base, called the Type Commander Headquarters Automated Information System (THAIS), contains only summary data. It is still necessary to go to the administrative commander or Refresher Training Group/Unit for detailed data.

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- **Operational Readiness Evaluations (OREs)/Operational Readiness Inspections (ORIs)** are given in each deployment cycle. They are given either as part of RFT/IRFT or by the administrative squadron commander during the inter-deployment period. The total RFT package is essentially equivalent to an ORE; the Battle Problem is equivalent to an ORI.

- **Operational Propulsion Plant Examinations (OPPE)** examine a ship's capability to perform the mobility mission. The OPPE is administered by the Fleet CinC Propulsion Examining Board (PEB) every two years, either before deployment or during the return transit. Every other OPPE can be observed by the Fleet Training Group during RFT/IRFT and certified to the PEB.

- **Command Inspections** are given approximately six months before each regular change of command. The emphasis is on administration and the material condition of the ship. They are subjectively scored and do not reflect operational performance. They do indicate to some extent the management ability of the senior enlisted and officer complement of the unit.

b. Aviation Training and Competitive Cycles

Aviation training cycles are based on deployments. Competitive cycles are 18 months, as is the case for ships.

(i) Competitive Exercises

Aviation units also perform graded exercises which enter into the calculation of unit readiness and the squadron's standing in the awards competition. These include ASW, air to surface (missile, bombing), air-to-air and Airborne Early Warning (AEW) exercises. ASW and air-to-air exercises provide objective data when performed on an instrumented range. Instrumented underwater ranges are located on each coast and Hawaii. Air Combat Maneuvering Ranges (ACMRs) are located on each coast. These use the Tactical Aircrew Combat System (TACTS), a highly advanced and realistic instrumentation system. TACTS provides information, instantaneously and on tape, on the flight dynamics, weapons system status, and weapons firing of each aircraft engaged in the exercise.

For objectivity, air-to-ground live-fire exercises (including those where dummy ordnance is used) require only that an observer be available to score the runs. AEW exercises can be objectively graded by ships, or on-board observers in some aircraft.

The results of competitive exercises are summarized at the type wing level. The format is generally hard copy, although some squadrons and wings are beginning to use personal computers. Computer data formats are not standardized. Data sheets generally list crews by name so these can be matched with personnel characteristics. The advent of

the NAVFLIRS system in early 1987 should make considerable data on training experience centrally available; however, historical training data generally are not complete above the squadron level. Certain flight information is available from the Readiness Analysis Branch of the Office of the Chief of Naval Operations (OP-515) or the Safety Center for previous fiscal years.

(ii) Wing Detachments and Competitions

Carrier air wings deploy to Fallon, Nevada each training cycle for intensive coordinated ordnance operations. These operations are conducted under simulated combat conditions and are a source of objective performance data for crews and larger flight elements. Performance data are maintained at the air wing level. However, as with squadron training history exercises, some training and experience data are available only at the squadron level.

Competitions at the wing and fleet level also are a source of objective data. However, these are "top gun" type competitions in which only the best from each squadron or air wing are represented. Such competitions provide highly non-representative stratified data.

(iii) Naval Aviation Operating Procedures and Standards (NATOPS) Qualifications

Each year every naval aviator and flight officer must requalify in their primary model aircraft. The annual NATOPS evaluation consists of a written exam, and simulator and actual flight checks by the squadron NATOPS officer. Pilots (crews of multi-seat aircraft) also are given a tactical check in the weapons system trainer (WST). These flight checks are considered highly objective even though the grading is based on the judgment of the NATOPS officer. The reason is that the NATOPS officer billet is a highly selective assignment and the NATOPS program is taken very seriously by the entire aviation community.

(iv) Inspections

In recent years the naval aviation community has deemphasized the performance aspect of training inspections. The Operational Readiness Evaluation (ORE) has been replaced by the Advanced Phase Evaluation (APE). The ORE for a Carrier Battle Group, for example, was a major evaluation of all units (ships and air wing) in a simulated combat environment, and was administered just prior to deployment. Individual units (ships and

aviation squadrons) were observed and graded by the Type Commander (TYCOM). The results of these evaluations were used in arriving at the unit's ORE grade, a heavily weighted factor in the rankings for the Battle Efficiency Award. The APE is similar to the ORE, except it is given earlier in the training cycle. Additionally, the emphasis is on whether or not the unit needs additional workup prior to deployment, and in what areas. Numerical grades are not given.

Certain quantitative measures can be derived from APE operations. Carrier landings are graded by the landing signal officer (LSO); landing scores and boarding rates (the percentage of successful landings) are recorded and retained by the type commander. These are considered to be two of the best indicators of individual aviator and ship/wing combined performance. NATOPS written exams also are given to all aircrew personnel, and these are objective indicators of squadron training performance. Maintenance Material Management (3M) data collected during an APE also are particularly good maintenance performance measures because the APE is conducted under intensive operating conditions. The 3M system (to be discussed below) publishes maintenance performance indicators for both ships and aircraft. These indicators, such as fully capable rates and utilization rates, are more meaningful when the unit is being pushed.

c. ASW Readiness/Effectiveness Measurement Programs

Ship Anti-Submarine Warfare Readiness/Effectiveness Measurement (SHAREM) exercises and Air Effectiveness Measurement (AIREM) exercises are intended to collect operational data for analyses of equipment performance and tactics development. They are observed by professionals who are in a position to evaluate the overall performance of the participating units as well as sub-elements by system. The evaluations have elements of both objectivity and subjectivity. Many of the exercises are conducted on instrumented ranges, however it is not always possible to control for equipment degradations or environmental conditions.

SHAREM data are maintained in a central automated data base. A computer AIREM data base is currently being developed. The concept is being extended to battle groups (BGAREM), for which a centralized automated data base is also being developed.

A major drawback to these exercises as sources of information on personnel performance is the inability to tie performance directly to individual aircrews or the personnel who are on watch when the exercise is conducted. A ship's crew is divided into

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watch teams. In order to complete a data set for a given exercise it would be desirable to retrieve individual day-to-day watch bills which are available only on board the ship.

d. Simulators

WST flight simulators are used extensively throughout the aviation community. Many of these are highly realistic, and all have the advantage of allowing the operator to replicate environmental conditions and opposing forces. Simulators have been used for research purposes with apparently excellent results.[15] They can be used for nearly every competitive exercise and are perhaps superior to actual flight experience for many AEW exercises.

Ship combat information center (CIC) and propulsion plant simulators also are used for training and could be used for generating performance data. Task group simulators are located on each coast and the Navy has a sophisticated theatre simulator (called NEWS) at the Naval War College that is used for large battle problems. The NEWS is used by fleet commanders for evaluation of plans and ship/task group commanders and staffs.

In general, the observations concerning availability of personnel characteristics and training data apply to simulator exercises as well as to those conducted at sea.

e. Integrated RAINFORM Analysis System (IRAS)

Every ASW sortie requires the sending of a message called a Rainbow Purple. This includes major exercises, competitive exercises and contacts on foreign submarines. These messages are correlated for each aircraft operating in a given exercise, and the data are maintained in a central computer data base. The purpose of the data base is to serve the research community. Crews are identified by name but not SSN, however, matches can be made based on UIC. For the period before NAVFLIRS, specific experience and training data must still be obtained from squadron records, but the data base highlights performance in an operational setting. It therefore is an excellent starting point for analysis of the determinants of operational performance.

f. Naval Aviation Flight Information System (NAVFLIRS)

As noted earlier, NAVFLIRS is a new program instituted in January 1987. It is patterned after a USMC program called Flight Readiness Data System (FREDS) and is

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[15] Alan J. Marcus and Lawrence E. Curran, CDR, USN. "The Use of Flight Simulators in Measuring and Improving Training Effectivness",*Proceedings of the Symposium on the Military Value and Cost-Effectiveness of Training*, Brussels, January 1985.

applicable to USMC and Navy flight crews. NAVFLIRS expands the previous flight reporting system and centralizes flight, logistics, and some performance and training data in a single data base. In addition to the flight hour and landing information previously reported, provision is made for reporting scores achieved on bombing/missile firings on the flight log (yellow sheet). Syllabus flights and the completion of competitive exercises are also reported. These data are then kept in a central data base along with logistics and maintenance information.

g. Maintenance Data

While operational performance is the pointed end of the spear, Navy ships and aircraft are integrated man-machine systems. In fact, one of the problems with many of the performance data sources is the difficulty in sorting out equipment and operator performance. For example, once an aircraft leaves the runway on a bombing competitive exercise, a failing grade due to an equipment malfunction may not be distinguishable from one caused by pilot error. Fortunately, maintenance data are extensive, centralized and, in most cases, objective. They provide information on the performance of maintenance personnel as well as the coordination between operations and maintenance.

(i) Aviation Maintenance and Material Management Program (3-M)

The most comprehensive maintenance data base is provided by the Aviation 3-M system. The 3-M data are derived from maintenance action forms generated by work centers at the squadron, intermediate (AIMD), and depot maintenance activities. NAVFLIRS data, training device utilization and maintenance information also are processed and reported by 3-M. The system is the regular maintenance reporting and management system for both the Navy and Marine Corps.

3-M data are used to develop reports on mission capable (MC) and fully mission capable (FMC) rates that are routinely used to track the material readiness of aircraft. Details such as non-faulty parts removed and average time to repair by individual work center and part number also can be monitored. Statistics such as mean time between failure and time to repair can be collected for component levels down to individual parts, by manufacturer.

3-M reports are available in a variety of formats and for any organizational level and type aircraft. Data also are available on magnetic tape for specialized research use with permission of the Department of the Navy. Data can be readily correlated with Navy and

USMC Enlisted Master Files, NAVFLIRS aircraft flight hours and flight code data, and Maintenance Training Improvement Program data.

(ii) Surface Maintenance and Management Material (3-M)

Surface 3-M data are not as comprehensive nor as standardized as are Aviation 3-M. These data are detailed to the level of manufacturer and Equipment Identity Code. Operating-hour data for ships are not reported by 3-M. Steaming hours, broken down by employment by day, are available from the CINCs and OP-643, and The Visibility and Management of Operating and Support Costs (VAMOSC) data base also contains some information about steaming hours.

(iii) Form 4855 Data

These data reflect information on equipment logs for selected combat systems. It is possible to tell when the equipment was on, when failures were detected, when parts were on order, and when failures were corrected. These data, which are kept at the Fleet Analysis Center under the sponsorship of NAVSEA, are very clean but not always accessible.

(iv) Casualty Reports (CASREPs)

When a ship suffers an equipment failure that adversely affects its ability to carry out its primary missions (and cannot be repaired within 48 hours), a casualty report is made. CASREPs range in severity from C-2 (partial degradation) to C-4 (loss of ability to perform at least one mission). CASREPs are subjective but they are taken very seriously in determining supply priority, and by the type commanders. CASREP data are readily available from the Ships Parts Control Center.

(v) Board of Inspection and Survey (INSURV)

The INSURV Board inspects approximately 100 ships each year; on average each ship is inspected every six years. Inspectors are highly trained and respected for their consistency. The INSURV is a material inspection which divides the ship into 25 equipment categories. Each category is scored according to a scale on which zero indicates no deficiency, one a deficiency and two a mission degradation. The sum of the categorical scores, called a Material Condition Index (MCI) is then calculated. The system is highly aggregated; for instance, all combat equipment is included in one category. The INSURV Board has recently developed a more detailed data base for selected equipment.

3. Marine Corps

a. Marine Corps Combat Readiness Evaluation System (MCCRES)

This system is similar to the Army ARTEP in some respects and is applicable to both ground and aviation units. The mission of every kind of unit is subdivided into tasks, and tasks into requirements. The mission of an infantry battalion, for example, is divided into 900 such requirements. Each requirement is defined such that its satisfactory accomplishment can be described by a yes or no. Tasks and requirements are not necessarily equal in their contribution to total mission and each is given a weight in determining overall unit score.

MCCRES measures the performance, under simulated combat conditions, of each unit against a set of well defined standards called Mission Performance Standards (MPS). For an infantry battalion there are 17 MPSs divided into four sections: all evolutions; amphibious assault and normal combat operations; specialized combat operations and use of outside support assets. Each section contains between three and seven MPSs, each containing several tasks. Each task in turn consists of several requirements.[16]

An evaluation is conducted by several observers who assign a value of 1 or 0 to each requirement according to whether it was satisfactorily executed. Internal evaluations are conducted throughout the training cycle to assist unit commanders in evaluating training readiness and planning training programs. At least every two years each unit is evaluated by a command specified by the Commander, Fleet Marine Force.

Data from external MCCRES evaluations, called Readiness Evaluations, are maintained at the inspected unit down to the squadron/battalion level. The evaluation records, which are stored on PC diskettes, are also forwarded to HQMC.

b. Aviation Training and Readiness Information Management System (ATRIMS)

ATRIMS keeps track of aircrew training and performance (officer and enlisted). Syllabus flights and exercises, for each pilot and observer, are entered and compared with required re-fly intervals and scores in order to calculate the Combat Readiness Percentage (CRP). CRP is a measure of readiness which enters into the squadron's reported unit

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[16] S. Zacks, W. H. Marlow and S.S. Brier, "Statistical Analysis of Very High-Dimensional Data Sets of Hierarchically Structured Binary Variables with Missing Data: An Application to Marine Corps Readiness Evaluations," *Naval Research Logistics Quarterly*, (32) 1985, pp. 467-490.

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readiness. Each aviator has a certain CRP at the completion of flight training which increases with experience.

ATRIMs draws on the inputs to the FREDS/NAVFLIRS data bases. However, ATRIMs cannot be accessed by any echelon above the squadron level. In general all personnel data, exercise scores (air to ground, air to air, AEW, etc.), Standardization Flight scores, and carrier landing scores for sea-based squadrons are available at the squadron level.

c. Maintenance Performance Data

The Aviation 3-M system was described under Navy Maintenance Performance Data. The Marine system is essentially the same and is maintained by the same organization. The ground maintenance data base is called the Marine Corps Integrated Maintenance Management System (MIMMS). MIMMS is neither as centralized nor as extensive as 3-M, primarily because it deals with less complex systems. Inputs are initiated by Equipment Repair Orders, which identify a piece of equipment that is down, the specific system, and required maintenance and supply actions. These orders are forwarded to one of four world-wide processing centers where they are retained for 15 months. Daily and monthly reports summarize the information by equipment, but not by unit.

4. Air Force

Within the Air Force, performance data bases reside primarily at the wing level; detailed exercise grades may exist only at the squadron level. Inspections, daily training and graded readiness exercises, and maintenance performance are reported to the wing, major command (MAJCOM) and Department of the Air Force at decreasing levels of detail. Specific reports, reporting procedures and formats may vary among MAJCOMS. The following discussion is based primarily on detailed interviews with Tactical Air Command personnel.

a. Aircrew Training Program

Unit training requirements are set by the MAJCOM, which is responsible for providing necessary resources for accomplishing the training. Squadrons are responsible for conducting training evolutions and qualifying aircrews in certain events, initially and at prescribed intervals, according to the experience of each individual. Training cycles are six months, beginning the first of January and July. The system of flight hour/syllabus training requirements is called the Graduated Combat Capability System. Different

numbers of training flights/hours are required during each cycle for experienced and inexperienced aircrews. Several kinds of performance information are generated as a result of the aircrew training program.

(i) Weapons Qualification Scores

Crews must qualify in certain weapons events to be certified as Mission Ready (MR). Qualifying events also include EW and tanking and logistics events for the Strategic Air Command and Military Air Transport Command (SAC/MAC). Detailed score sheets (AF forms 206 and 107) for weapons qualification events are retained by the squadron for at least the current and previous training cycles (they may be retained in individual training records for a longer period, but this is not standardized). Gun-camera film is used for scoring and is perhaps the most objective source of weapons event performance data; however, there is no requirement to retain film for any specific length of time and retention varies across units.

SAC scores for both daily training and qualification events are maintained by the First Combat Evaluation Group. For events flown prior to July 1987 it is not possible to match sorties with individual aircrews without going to the squadron. However, the form (1CEVG 95) contains space for this information, and commencing in July 1987 the primary aircrews last four SSN digits and first two letters of the last name are included on the form.

Weapons qualification event scores are generally a source of objective performance data. These data were used along with HORIS data in the previously cited USAF analysis of the effect of experience on bombing performance.[17]

(ii) Wing Detachments and Competitions

TAC wings deploy to Nellis AFB, Nevada on an 18 month cycle, where all aircrews who have progressed to a specified point in the syllabus participate in exercises called Red Flag (Green Flag for ECM). The Air Force Human Resources Laboratory (AFHRL) is currently analyzing Red Flag data along with personnel and training data obtained from DMDC and AFMPC.[18]

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[17] op.cit., Lt Col Thomas E. Cedel, and Lt Col Ronald P. Fuchs.

[18] Discussions with N. Greenhalgh, AFHRL.

Annual "Top Gun" competitions are held at the squadron level through the MAJCOM level. These culminate in competitions (William Tell, air-to-air; Gunsmoke, air-to-ground) among the top teams from each MAJCOM within the Tactical Air Forces. SAC also has annual bombing/SRAM competitions. As noted previously, Top Gun awards are highly selective, and provide non-representative data. However, interesting results concerning the effect of equipment sophistication across delivery profiles have been obtained using Gunsmoke data.[19]

(iii) Standardization/Evaluation (STAN/EVAL)

Every aircrewman must pass an annual comprehensive evaluation of overall airmanship and operational ability, which is administered by the wing Standardization Board/Evaluator. Records of flight/simulator checks and written exams, ACMR results and gun-camera film are kept at the wing and squadron levels. With the exception of SAC, the wing STAN/EVAL program is evaluated by the MAJCOM Inspector General during Operational Readiness Inspections (ORIs). The First Combat Evaluations Group conducts ORI evaluations of SAC STAN/EVAL programs and maintains the data.

b. Inspections

Operational and Administrative inspections are conducted by the MAJCOM Inspector General (IG). Wings also conduct Self-Initiated Operational Readiness Inspections (SIORIs) in preparation for the IG inspection. The format is essentially the same, with all events being scored by the wing.

(i) Operational Readiness Inspection (ORI)

The wing is notified that an ORI will be given sometime within a 45 day period, but is not told the exact date. Phase I of the ORI evaluates the wing's initial response and its ability to deploy the wing assets. Phase II tests its ability to plan and execute operations in a simulated combat environment. Simulated combat sorties are flown against an opposing force for approximately a four day period. Because of the duration of the exercise, supply and maintenance are not tested for sustainability. Adherence to doctrine and 24-hour aircraft availability during the four day period are evaluated by professional teams of

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[19] K. Lindsey, Lt Col Paul R. Dordal, and Lt Col M.S. Brake, *Gunsmoke 1985 Statistical Summary and Lessons Learned*, USAF, HQ TAC, Directorate of Operations Analysis, Tech Report 86-2, March 1986.

observers. The exercises are designed to evaluate the wing in every weapon-delivery profile.

Gun-camera film and ACMR data are evaluated, and these are retained at the wing along with score sheets. Personnel characteristics, training, and performance data are therefore all available at the wing.

(ii) Management Effectiveness Inspection (MEI)

The MEI is an administrative inspection of the entire base, and concentrates on administration, special programs and the support side of the base, wing and squadron. Grading is detailed and systematized, but subjective. The grading criteria reflect adherence to doctrine; however, the observer teams are professional, and every base within a MAJCOM is observed by the same team.

c. Simulators

Either 4 or 6 sorties are required each half cycle in Aircrew Training Devices (ATDs), depending on experience. ATDs are also used in specialized training programs and for Stan/Evals and instrument checks. Detailed score sheets (Form 206s) are filled out for ATD sorties and retained at squadron or wing level as appropriate.

d. Maintenance Data

The maintenance data reporting system resides at the wing level with summary reports going to the MAJCOM. The system is similar to the Navy 3-M system. Maintenance status is kept by aircraft and maintenance squadron, and summarized every 24 hours in the Daily Status, Flying and Performance Report. Data which are summarized daily include mission-capable rates, full-mission-capable rates, utilization rates, aborts (air and ground), repeats, sorties, break rates, fix rates and cannibalization rates. Additional data summarized monthly at the MAJCOM level include Foreign Object Damage (FOD) and dropped object damage.

Maintenance Training Information is also maintained at the wing level as part of the centralized aircraft maintenance system. An OJT and required task book is kept on each person. Individual progress and qualifications are tracked in order to maintain certification.

IV. SUMMARY AND RECOMMENDATIONS

A. SUMMARY

Conceptual links exist between MPT policy and Defense Department outputs -- military performance, readiness and defense capability. The use of explicit quantitative links to such outputs could lead to the development of improved MPT policy.

The lack of performance data traditionally has been given as the reason for not developing quantitative relationships between MPT policy and military performance, but we have shown in Chapter III that performance data exist, and that they are accessible and in usable form. Furthermore, we have shown that information concerning personnel characteristics and training, which are needed to draw inferences about the determinants of unit performance, also are available. Information on the operational and maintenance performance of units, crews and individuals is gathered routinely. Indicators of unit-level operational proficiency are not generally available from any central repository, but maintenance and some individual/crew performance data are centrally available.

Many sources of information on performance in the military were identified in Chapter III. In conjunction with available data on training and personnel characteristics, they appear to be suitable for output-oriented analyses of personnel and training policies. As was noted earlier, available performance data fall into three categories: data pertaining to individuals, data at the level of crews, squads or systems, and data concerning the performance of command units. This section reviews our findings about each of these three categories of data and about maintenance data, which may be available at either the system or command level.

In general, the larger the entity the more difficult it is to obtain objective data on performance, and the more difficult it is to control for external effects and draw clear inferences. Of course, the larger the unit the more relevant are any inferences to our objective -- understanding the determinants of military effectiveness.

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1. Unit Level Performance Data

Command unit performance data -- what we are most interested in -- are available in some form for all four Services. These are also the least used for analytic purposes. The reasons most often given for failure to use these data are:

- Too much emphasis on performance could negate the purpose for which unit performance measures are defined in the first place. Allowing access to information on unit standings could provide an incentive to cover up rather than highlight and correct deficiencies.

- Scoring is inexact, incomplete or too subjective.

- It is too difficult to control for environmental factors, such as weather, quality of opposing forces, underwater sound profiles, etc.

These reasons are also used to explain the dearth of analyses of performance at the crew/squad and individual levels.

The question appears to be not so much whether data are available as whether the potential gain is worth the cost. The objection to gathering and using performance indicators for analyses and central management appears to be confined to operational performance. Information on maintenance performance is used routinely by the Services to develop, assess and justify policy (though more for policy regarding spare parts than personnel). There is concern, though, that making data on operational performance more widely available would dilute the incentives of commanders in the field to evaluate their subordinate units accurately, for fear that bad performance would reflect badly on them. However, analyses of MPT policies, using performance data, can be done without making the performance data widely available. The identity of the units that lie behind the data can be suppressed without damaging the analyses.

The question of whether or not the data are accurate enough for use as a basis for MPT policy decisions is an important one. However, the data are being used for policy decisions now. For example, if it is determined that a unit needs more training in a particular area before deploying outside CONUS, that is a policy decision. If data are adequate to support such a decision, it is reasonable to believe they are adequate to support decisions about specific Service schools, OPTEMPO, or the mix of grades and occupations required for a deploying unit.

Controlling for environmental factors is primarily technical in nature. It is the job of the analyst to observe and select appropriate control variables from what exists. In

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addition, failure to control for environmental factors is unlikely to contaminate the kinds of statistical analyses we envision unless there are systematic relationships between the omitted factors and the policy-related variables being studied. It is, for example, not likely that tank crew members with high entry test scores perform graded exercises in weather that is signficantly different on average from those with lower test scores. Unless such a difference exists, there is no need to control for weather in an analysis of the importance of having high mental group personnel in tank crews.

Unit performance can be measured directly or aggregated from the performance of individuals or crews/systems/squads. But direct measurement is preferable because it measures command performance unambiguously. Direct measurement data also are more difficult to obtain. Both the Army and Marine Corps have comprehensive standards for unit performance and programs for implementing these standards. The National Training Center provides an instrumented range for evaluating unit performance with respect to these standards. A concentrated effort is currently underway to improve the quality of NTC evaluations and to establish a quantitative data base. Underway Refresher Training and the SHAREM data base are sources of direct measurement ship performance data. Battle problems and ship mission exercises (ASW, AAU, ASU, etc.) are truly unit evolutions. Although the success of an ASW exercise hinges critically on the individual sonar technician, the ability to communicate, maneuver and bring weapons to bear is just as crucial to the success of the operation. Aviation units can be evaluated directly in some cases. Air Force ORIs and Navy/USMC wing exercises at Fallon, Yuma and Oceana include simulated combat exercises involving many aircraft which test the coordination of the entire unit. AIREM exercises lasting for an extended time test the ability of a squadron or wing to put units on station, and effectively operate for an extended period. Some aspects of unit performance are directly measurable during APEs. Boarding and launch rates, for example, reflect unit performance directly. Standardization/Evaluation and NATOPS evaluations also measure unit performance directly. Aviation units can also be evaluated operationally in two stages. Maintenance performance during major wing evaluations measures a unit's capability to bring forces to bear, and individual crew/flight performance measures its ability to execute its mission. The AIREM and Integrated RAINFORM Analysis System data bases provide centrally available performance information for coordinated flight operations as well as for individual ASW crews.

Training and personnel characteristics' data bases exist at the command unit level for all Services. Additionally, much of the required data are centralized at the respective

Service personnel centers. The Navy and Marines also are establishing aviation maintenance training data bases as part of the Maintenance Training Improvement Program (MTIP). These can be accessed centrally and contain essentially all required training data at the unit level.

2. Crew/Squad/System Performance Data

These data are available and are in general more objective than command unit performance data, but their link to ultimate military effectiveness is somewhat more remote. For one thing, there is an aggregation problem in building up to unit performance. For example, the connection between total unit performance and performance at the crew level may be weakened if leadership is not properly factored into the performance model. Better crews will perform better as a unit ceteris paribus, but the unit's performance will also depend on how well it is integrated and led. Perhaps information on the characteristics of unit commanders could fruitfully be included as variables in unit level analyses.

In general, personnel characteristics and training data paralleling crew/squad/system performance data reside at the squadron/ship/battalion level. However, for Navy, Marine and Air Force aircrews much of this information is centralized in the Marine Corps FREDS, Navy/Marine NAVFLIRS and Air Force HORIS data bases. For all Services, externally graded exercises (Navy SELEXs and Competitive Exercises, Army qualifying weapons tables, Air Force CGG and weapons qualification sorties, Marine Corps ATRIMS/CRP qualification sorties), or key checks such as NATOPS or STAN/EVALS, are the most promising sources of crew performance data. Detailed score sheets as well as training data for many of these exercises are kept at the wing or administrative command level.

Simulator exercises are also potentially valuable. Flight and gun/missile simulators are becoming increasingly realistic. They have the advantage of allowing replication of carefully chosen environmental conditions.

3. Individual Performance Data

Throughout our research and discussions with personnel we concentrated on investigating command units and crew/squad/system data, though some individual performance data bases were discussed. Programs, such as the Army Individual Training Evaluation Program and the Navy/Marine Corps Maintenance Training Improvement Program are sources of individual performance data. Such data can also be aggregated to

yield measures of unit training performance. Individual performance is also reflected in achievement on Navy advancement exams, or the Air Force Weighted Promotion System tests. Advancement history within an occupational specialty also can be used as a proxy for individual performance.

As with crew/squad/system performance measures, individual performance measures can be used to derive either dependent variables in studies of recruiting, retention, promotion, or training policies, or in some cases, independent variables in analyses of unit performance.

4. Maintenance Performance Data

Maintenance and supply data are available at all levels, and are generally more objective and complete than operational performance data. These data also are centrally located in automated data bases. Maintenance performance directly reflects the proficiency of maintenance personnel. In addition to its important direct effect on operational capability, maintenance performance has an indirect impact through its effect on the affordability of weapons systems. Approximately seventy percent of the life cycle cost of a weapons system is in Operations and Maintenance. Analyses of the MPT determinants of maintenance performance could therefore have a high payoff.

B. RECOMMENDATIONS

Our review of sources of data on performance in the military, and our acquired familiarity with the existing literature that relates the characteristics and training of personnel to performance, leads us to four broad recommendations. They are listed here in order of the speed with which they can be implemented:

- Strive to use the results of existing research.

- Identify and perform a set of initial analyses that address policy issues of particular interest.

- Further institutionalize the development of automated data bases that can be used in analyses of personnel and performance.

- Encourage a long-term effort for quantifying the links between manpower, personnel and training policies and measures of performance.

The remainder of this chapter briefly discusses these four recommendations.

1. Using Existing Research

A modest body of literature ties personnel characteristics and training histories to measures of operational or maintenance performance. This literature could serve two fruitful purposes. First, it could be used to develop a set of performance-based insights into personnel and training policies which might include the following:

- A package of occupation-specific retention bonuses designed to increase seniority in the enlisted force. This would take advantage of the finding that, in many roles, senior personnel are substantially more productive than junior ones.[20]

- Plans to obtain more years of flying from pilots. This would involve cutting down on the non-flying assignments of relatively young pilots and, perhaps, providing more flying assignments for older pilots. The previously cited work of Cedel and Fuchs points in this direction.

- Reconsideration of Navy plans to provide a larger fraction of initial skill training aboard ship. Such a policy has been found both to delay competence and to distract senior personnel from their other duties.[21]

In addition, existing research could help refine efforts to quantify the overall quality of the enlisted military force. This would involve using quantitative estimates of the relative contribution to performance of personnel with different levels of experience, intelligence and education to develop indices of personnel quality. In some cases it would be possible to take into account that as a particular beneficial characteristic (like experience) becomes more prevalent in the force, its additional contribution to improved performance is likely to diminish. The work of Marcus probably provides the best evidence of the value of experience beyond the first term, while that of Scribner *et al* provides information on the value of intelligence.[22] Such an approach would require one to assume that results obtained for a small group of occupations could be extrapolated broadly, but it would at least provide a useful check on (and supplement to) estimates of enlisted force quality that have been developed to date -- one more firmly based on the performance of units.

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[20] See, for example, Deborah Clay-Mende, Ellen Balis, Kurt A. Driscoll and Robert F. Lockman, *Balancing Accession and Retention*, CNS 1176, Center for Naval Analyses, September 1982 and Alan J. Marcus, *Personnel Substitution and Naval Aviation Readiness*, Professional Paper 363, Center for Naval Analyses, October 1982.

[21] See Rodney Weiher and Stanley A. Horowitz, *The Relative Costs of Formal and On-the-Job Training for Navy Enlisted Occupations*, Professional P..., Center for Naval Analyses, November 1971.

[22] Barry L. Scribner, D. Alton Smith, Robert H. Baldwin, and Robert W. Phillips, "Are Smart Tankers Better Tankers: AFQT and Military Proficiency," Office of Economic and Manpower Analysis, U. S. Military Academy, December 1984.

2. Performing Initial Studies

Re-orienting MPT policymaking to focus on the implications of policy decisions for military performance will take a long time, but the success of any long-term effort requires short-term evidence that the effort will be worth the trouble. The best possible evidence would be the generation of usable policy insights. We recommend striving to generate such insights within two years.

This program of short-term research should commence by deciding what policy choices are most in need of calibration in terms of their impact on performance. This should determine what to look at first. Candidates for the list of initial studies should include the following:

- The impact on operational performance of reduced operating tempo (and, hence, reduced levels of unit training) in all the Services. Congressional pressure on this portion of the budget makes operating tempo a timely issue.

- Greater examination of the importance of intelligence. Recent military pay raises have failed to keep pace with civilian wage levels. Evidence is that this is likely to adversely affect both the accession and retention of personnel in the upper mental groups. Information regarding the implications of this for performance could be most valuable.

- Comparisons of the proficiency of forces manned by reserve personnel with those manned by active personnel. There have been prominent discussions of removing some units from Europe and converting them to CONUS-based reserves in order to save money. Consideration of this option shouldn't be done without examining the performance implications of the shift.

- The value of seniority. Congress has noted that the average level of seniority in the Services has grown, raising personnel costs. Some are considering relying on existing analyses of the increased proficiency of a more senior force to recommend a decrease in the number of military personnel on active duty. This may be appropriate, but further analysis would help guide specific decisions about whether or not to cut, how much to cut and where to cut.

- The impact of personnel turnover on unit performance. Personnel movement costs the military a great deal; it also disrupts smooth working relationships that have been built up over time. Quantifying the implications of these disruptions for performance could provide an impetus toward increased personnel stability.

For all of these study areas the initial step will have to be illustrative, since the same relationship cannot be expected to hold for all occupations or kinds of units. For example,

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there is no reason to believe that operating tempo has the same impact on proficiency in B-52s, C-130s and F-15s. But illustrative results can be very useful. Finding a specific quantitative relationship between operating tempo and aircrew proficiency for a particular kind of aircraft performing a particular mission is concrete evidence that readiness suffers when the flying hour budget is cut, even though we don't know how much it suffers in most cases. It shifts some of tne burden of proof onto those who want to reduce flying hours. This is the kind of payoff a carefully chosen set of initial studies can provide.

3. Developing Computerized Data Bases

As has been noted, allowing access to information on performance for research purposes, especially the performance of units, is viewed with considerable skepticism by the Services. Such information has the potential of revolutionizing the ways in which personnel and training policies are formed, evaluated and justified, but the revolution can only take place if performance data are easily accessible for analytic purposes. Easy accessibility implies not having to start every study by convincing suspicious operators that study results cannot possibly be used against them and not having to create a performance data base by laboriously copying large volumes of data from poorly kept paper files.

Can the legitimate concerns of the Services be reconciled within the requirements of policy-oriented research? We think that the only feasible approach to reconciliation is the recognition of the control of the Services over their own data. If this control is recognized, it should be possible to develop data sets that minimize the chances for misuse or punitive use without adversely affecting the prospects for productive research. The following steps could facilitate such development.

a. Enunciate a DoD policy supporting the use of information on the performance of individuals and units to study the effectiveness of policies regarding personnel and training. Make it clear that the Services are in charge of determining the nature of this use.

b. Initiate a multi-Service group to develop guidelines for centralizing the location of performance data for each Service. These guidelines might well include removal of unit and individual identifying codes; if these codes were removed, it would be necessary to merge performance data with relevant information on personnel characteristics and training histories before the removal took place. The adoption of uniform guidelines would permit the performance of parallel research across the Services.

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c. Request that the Services identify the types of data to be computerized and centralized.

d. Provide funds earmarked for the purposes of developing the necessary software and doing the processing required to develop the desired data bases.

e. Make provisions for the periodic updating of the data bases.

f. Recognize Service responsibility for permitting access to the data bases for research purposes. The data bases themselves could either be held by the Services or by a centralized organization. The key point is that the Services would have control over their dissemination.

It is possible that following this plan would yield an environment that still inhibits the sorts of policy research we are interested in promoting, but it should assuage many of the concerns about the misuse of data. In any case, without strong assurances of both central support and Service control, it seems unlikely that concerted progress will be made toward the goal of getting access to the data necessary for tying manpower, personnel and training policies to performance.

4. Encouraging a Long-term Research Effort

It is tempting to suggest a co-ordinated effort to quantify all the links in Figures 2-3 and 2-4, but this probably would be misguided. To a considerable extent the policy development process is a decentralized one. The Services, and particular offices in the Services, have a lot of independence in developing many aspects of MPT policy. They must have control over their own research programs in those areas where they develop policy. Still, there are several ways in which the Office of the Secretary of Defense can encourage appropriate research to link MPT policies to readiness and performance.

- Direct that MPT policies be developed and evaluated on the basis of their effect on performance, as much as possible.

- Review specific Service policies with an eye toward their justification in terms of performance. Regularly ask the Services to provide such justification.

- In areas where a uniform DoD policy is required, such as the level of pay or the nature of the retirement system, OSD should sponsor research to develop relationships between policy decisions and indicators of performance.

Taking these three steps should produce an environment which, over time, will assure the quantification of a wide range of relationships between MPT policies and

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military performance. The data and techniques exist to build these relationships. They can provide a more firm underpinning for DoD's personnel-related policies than has ever existed.

GLOSSARY

AAW	- Anti-air Warfare
ACMR	- Air Combat Maneuvering Range
AEW	- Airborne Early Warning
AFHRL	- Air Force Human Resources Laboratory
AFMPC	- Air Force Manpower Center
AFORMS	- Air Force Operations Resource Management Systems
AFQT	- Armed Forces Qualification Test
AFSC	- Air Force Speciality Code
AIMD	- Aviation Intermediate Maintenance Department
AIREM	- Air Effectiveness Measurement
AMW	- Amphibious Warfare
APE	- Advanced Phase Evaluation
ARI	- Army Research Institute
ARTEP	- Army Readiness Training Evaluation Program
ASD(RA)	- Assistant Secretary of Defense for Reserve Affairs
ASI	- Additional Skill Identifier
ASU	- Anti-Surface Warfare
ASW	- Anti-Submarine Warfare
ATD	- Aircrew Training Devices
ATRIMS	- Aviation Training and Readiness Information Management System
ATSS	- Aviation Training Support System
BGAIREM	- Battle Group Air Effectiveness Measurement
BLTM	- Battalion Level Training Model
CALL	- Center for Army Lessons Learned
CASREP	- Casualty Reports
CBO	- Congressional Budget Office
CCC	- Command, Control and Communication
CINC	- Commander-in-Chief
CNA	- Center for Naval Analyses

CRP	- Combat Readiness Percentage
CTT	- Common Task Test
DMDC	- Defense Manpower Data Center
DoD	- Department of Defense
(D)TPDC	- (Defense) Training and Personnel Data Center
ELW	- Electronic Warfare
EMF	- Enlisted Master File
EMR/OMR	- Enlisted Master Record/Officer Master Record
FHP	- Flying-Hour Program
FMC	- Fully Mission Capable
FOD	- Foreign Object Damage
FREDS	- Flight Readiness Data System
FSO	- Fleet Support Operations
GAO	- Government Accounting Office
HORIS	- Hormats' Information System
HQDA	- Headquarters Department of Army
IG	- Inspector General
INSURV	- Board of Inspection and Survey
IRAS	- Integrated RAINFORM Analysis System
IRFT	- Interim Underway Refresher Training
ITEP	- Individual Training Evaluation Program
ITMS	- Integrated Training Management System
JSPD	- Joint Services Planning Document
LOG/FSO	- Logistics/Fleet Support Operations
LSO	- Landing Signal Officer
MAJCOM	- Major Command
MATMEP	- Maintenance, Analysis, Training Management and Evaluation Program
MC	- Mission Capable
MCCRES	- Marine Corps Combat Readiness Evaluation System
MCI	- Material Condition Index
MEI	- Management Effectiveness Inspection
MILES	- Multiple Integrated Laser System
MILPERSCEN	- Military Personnel Center
MIMMS	- Marine Corps Integrated Maintenance Management System

MIW	- Mine Warfare
MOB	- Mobility
MOS	- Military Occupation Specialty
MPT	- Manpower Personnel and Training
MTIP	- Maintenance Training Improvement Program
3M	- Maintenance, Material, Management
NAMTD	- Naval Aviation Maintenance Training Detachment
NATOPS	- Naval Aviation Operating Procedures and Standards
NAVFLIRS	- Naval Flight Information Reporting System
NEC	- Navy Enlisted Classification Code
NITRS	- Navy Integrated Training Resources Subsystem
NTC	- National Training Center
OJT	- On-the-Job-Training
OMF	- Officer Master File
OPPE	- Operational Propulsion Plant Examination
OPTEMPO	- Operating Tempo
OPTIP	- Operations Training Improvement Program
ORE	- Operational Readiness Evaluation
ORI	- Operational Readiness Inspection
OSD	- Office of the Secretary of Defense
PA&E	- Program Analysis and Evaluation
PAS	- Personnel Account Symbol
PEB	- Propulsion Examining Board
PSA	- Post Shakedown Availability
RFT	- Underway Refresher Training
ROH	- Regular Overhaul
RUC	- Reporting Unit Code
SAC	- Strategic Air Command
SELEX	- Selected Exercise
SECDEF	- Secretary of Defense
SHAREM	- Ship Anti-Submarine Warfare Readiness/Effectiveness Measurement
SIORI	- Self-Initiated Operational Readiness Inspections
SMF	- Student Master File
SQC	- Special Qualification Code

SQT	-	Skill Qualification Test
SSN	-	Social Security Number
STRAC	-	Standards in Training Commission
TAC	-	Tactical Air Command
TACTS	-	Tactical Aircrew Combat System
TEC	-	Training Event Code
THAIS	-	Type Commander Headquarters Automated Information System
TMACS	-	Training Management Control System
TRX	-	Training Exercises
TYCOM	-	Type Commander
UIC	-	Unit Identification Code
VAMOSC	-	Visibility and Management of Operating Support Costs
WST	-	Weapons System Trainers

APPENDIX A

CLASSIFICATION OF PERSONNEL, TRAINING AND PERFORMANCE DATA

TABLE A-1. CLASSIFICATION OF PERSONNEL AND TRAINING DATA (ALL SERVICES)

SERVICE 1) CONTRACT, AGENCY 2) DATABASE NAME 3) REFERENCE	DATA HELD BY	FORMAT	WARFARE AREA	LEVEL	TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE	CREW PERFORMANCE	UNIT PERFORMANCE	OBJECTIVITY	RELATED DATA	REMARKS
DEPARTMENT OF DEFENSE 1) Defense Manpower Data Center (DMDC) 703-696-5823/409-646-3661 2) Enlisted/Officer Master File 3) DMDC Annual Report	DMDC	A	ALL	INDIV	1971-(8A) 75 (Q)	SSN, UNIT ID	X								
ARMY 1) Military Personnel Center Ofc State Support Division Data Administration Directorate 703-325-5344/6694 2) Officer/Enlisted Master File 3) Army Regulation 640-10 Enlisted Army Pers Record	MILPERCTR	A	ALL	INDIV		SSN, UNIT ID	X	X							
1) Army Training Support Center AV927-5709/4110/7/5296 Integrated Trng Eval Div (ITED) 804-878-4441/5332/5343 2a) Initial Trng Eval Prog (ITEP) (a) Skill Qual Test (SQT) (b) Common Task Test (CTT) (c) Commander's Evaluation	MILPERCTR ITEDAINT ITEDAINT UNIT	A	ALL	INDIV		NAME, SSN, MOS	X	X			O&M (MOS)		H, M, M	PERS- DMDC, MILPERCTR	TEST RESULTS USED BY PROMOTION BOARDS AND FOR DESIGNING TRAINING PLANS. ITED IS RESPONSIBLE FOR ANALYZING RESULTS AND ADVISING SCHOOL COMMANDS OF GENERAL DEFICIENCIES.
2b) Standards in Trng Commission 804-878-4854/4858	STRAC BATT	A	ALL	INDIV				X	X		O	O	M-H	PERS, TRNG, OPTEMPO	STRAC IS TOP DOWN RESOURCE ALLOCATION SYSTEM. DATA BASE RESULTS FROM VALIDATION AND ANNUAL QUALS.
2c) Battalion Level Trng Model (a) Indiv/Crew Weap Annual Quals (b) Crew Ammo Live Fire Exercise (c) Simulator Exercise 3) DA CIRC 350-85-1	BATT AGGREG AT DIV	HC	ALL	INDIV WEAP SYS BATT				X	X		O	O	M	PERS, TRNG, OPTEMPO	STRAC- DEFINES TRNG STRATEGY IN TERMS OF ANNUAL PERS AMMO RESOURCES. THIS IS COMBINED WITH OPTEMPO WHICH CONSIDERS POL, SPARE PARTS. STRAC SETS STNDRDS AND UNIT CDR DETERMINES STRATEGY FOR MEETING STNDRDS WITHIN ALLOTTED RESOURCES.

KEY:

Event	Performance	Objectivity
A - Automated	O - ?	H - High
PC - Personal Computer	M - Maintenance	M - Medium
HC - Hard Copy	MOS - Occupational	L - Low

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TABLE A-1. (Cont.) CLASSIFICATION OF PERSONNEL AND TRAINING DATA (ALL SERVICES)

SERVICE	DATA HELD BY	FORMAT	WARFARE AREA [4]	LEVEL	TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE	CREW PERFORMANCE [5]	UNIT PERFORMANCE [5]	OBJECTIVITY [5]	RELATED DATA [4]	REMARKS
NAVY															
1) Deputy Chief of Naval Operations (Manpower, Personnel & Training (OP-120) 202-694-5307															
2) Enlisted Master Record (EMR)	OP-120	A	ALL	NDV	1971-75 (9A CM) 1975 CM (O)	SSN, UIC, DUTY, HIST.	X	X							EMRONRs ARE ESSENTIALLY COMPLETE SERVICE RECORD FOR EACH INDIVIDUAL. - SMF SHOWS ALL SCHOOLS ATTENDED & PASS/FAIL (NO NUMERIC GRADES) DATA ALSO FORWARDED TO CMA
2) Officer Master Record (OMR)	OP-120	A	ALL	NDV			X	X							
2) Student Master File (SMF)	OP-120	A	ALL	NDV			X	X							
1) Navy Enlisted Corps Flying Host Count (OP-51C) 697-5433, 694-2127 Navy Maintenance Support Office (NAMSO) SP86 Mechanicsburg PA, AV 430-2031	NAMSO	A		NDV	01/87- PRES	SSN, UIC	X	X	X	O	O		H	MATOPS, COMRDES, ALL OPERATIONAL PERFORM DATA	COMBINES FLIGHT AND LOGISTICS DATA. - FLIGHT DATA INCLUDES WEAPONS AND EXERCISE SCORES, SYLLABUS COMPLETIONS.
2) Naval Flight Information Reporting System (NAVFLIRS)															
3) OPNAVINST 3710.7L MATOPS															
1) COMNAVAIRLANT (Training) 804-444-3016 FITWING ONE	TYPE WING CMAL	A (ATISP)	AVA	NDV SQDRN WG TYPE CDR	1944- PRES	SSN, UIC, COURSES, A/C TYPE & SYSTEM	X	X	X	M			H	3-M AVIATION PERS-DMDC EMI-OP 130	*INDIVIDUAL TEST SCORES
2) Maintenance Training Improvement Program (MTIP)															
3) CMAL INST 1510.2E MTIP 28 March 1993															

KEY:

Format
A = Automated
PC = Personal Computer
HC = Hard Copy

Performance
O = Operations
M = Maintenance
MOS = Occupational

Objective
H = High
M = Medium
L = Low

TABLE A-1. (Con't.) CLASSIFICATION OF PERSONNEL AND TRAINING DATA (ALL SERVICES)

SERVICE 1) CONTACT: AGENCY 2) DATABASE NAME 3) REFERENCE	DATA HELD BY	FORMAT	WARFARE AREA [4]	COVERAGE LEVEL	TIME PERIOD	KEY FIELDS	Personal Characteristics	Individual Training	Unit Training	Individual Performance [3]	Crew Performance [3]	Unit Performance [3]	Objectivity [4]	RELATED DATA [4]	REMARKS
NAVY															
1) DCNO (Rev.6 FOLHWYMOOS MBAR'ed Personnel Reporting) (OP-943) 202-694-1279 2) Type Commander Ship Employment Sched	OP-943	A	ALL	SHIP, SQDRN, SHIP SYSTEM		UIC, EXERCISE TYPE			X					NAVFLIRS, SHAPER, APRM, APE, 3-M AVIA 3-M SHP	
MARINE CORPS															
1) Deploy Cdr for Management (Information sthtnnl-Code MPI-30) 202-694-4555 2) Manpower Management System File (MMPF) HO MPI-30 3) MC Ord P1080.20 JUMPS/MMS CH-4 25 Mar 85	HO MPI-30	A	ALL	INDV		BBN, RUC, MOS	X	X						MCCRESCREW PERY TRAINING RECORD ALL HELD BY UNIT	MMF IS UPDATED ELECTRONICALLY, FROM THE FIELD. LAST 3 SCHOOLS, LAST 3 ASSIGNMENTS, NO GRADES.
1) HOUSMC DC/S Training (Aviation TRNG Avn) & Design Section) AA2310 202 694-2447 2) Flight Readiness Data System (FREDS)	HOUSMC DC/S Training	A	AVIA	CREW	3 OR 4 MO. AVERAGE OF PILOTS CEP'S	FLIGHT DATA, ORD DELIV CEP's NAME AND BBN	X	X	X	O	O		H	SAME AS ABOVE PLUS ATTRIB DATA WHICH GIVES COMBAT READ PERCENTAGE (CRP)	FREDS WAS MODEL FOR, AND IS BEING REPLACED BY NAVFLIRS. INCLUDES SYLLABUS FLIGHT PROGRESSION, AND ORDNANCE DELIVERY SCORES.
2) Maintenance Training Management Analysis (MATMEP) 3) USMC Order P 4790 of 13 Jan 87	HOMC ON COMPUTER ASSISTED SYSTEM APPROACH TO TRNG (CABAT)	A CABAT	AVIA MAINT PERS	INDV SQDRN	CURRENTLY BEING AUTOMATED	BBN, MOS, TRNG, DATA (OJT, AUTOMATED SCHOOLS ETC.)	X	X	X		M	H	H	MTP PERS-DPDC MAINT PERSNL NALDA	MATMEP TRACKS ALL AVIATION MAINT ENLISTED PERSONNEL WHEN ATIMS IS COMPLETE DATA SYSTEM WILL ENABLE LINKING MATMEP, MTP, 3M AND DPDC PERSONNEL DATA. *INDIVIDUAL TEST SCORES

* KEY:

Format:
A. – Automated
PC – Personal Computer
HC – Hard Copy

Performance:
O – Operation
M – Maintenance
MOS – Occupational

Objectivity:
H – High
M – Medium
L – Low

A-3

TABLE A-1. (Con't.) CLASSIFICATION OF PERSONNEL AND TRAINING DATA (ALL SERVICES)

SERVICE	DATA HELD BY	FORMAT	WARFARE AREA (a)	COVERAGE LEVEL	COVERAGE TIME PERIOD	COVERAGE KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE (b)	CREW PERFORMANCE (c)	UNIT PERFORMANCE (d)	OBJECTIVITY (e)	RELATED DATA	REMARKS
US AIR FORCE															
1) USAF Military Personnel Center (AFMPC/DPMY) Randolph AFB 512-652-4765 2) Master Personnel File (MPF) (Enlisted & Officer)	AFMPC	A	ALL	NOW		SSN, PAS, SCHOOLS, DUTY, HIST.	X								AUTOMATED CURRENT SERVICE RECORD. OFFICER AND ENLISTED. INCLUDE ASSIGNMENT HISTORY, SCHOOLS ATTENDED.
1) HQ USAF Warrior Management (HQOTW) (HQ SFR70) 2) HORB Report	HQOTW	A	ALL	NOW RATED/NON RATED (SSN)	ENTIRE SERVICE HISTORY (FLT TIME AND SORTIES 30 DAY PERIOD)	FLIGHT DATA, TRNG PAST TWO YRS	X	X		X			H	AFORMS EXERCISE, STAN EVAL, TOT SYLLAB AT SODRW WING	HORB GIVES COMPLETE CAPSULE HISTORY OF FLIGHT EXPERIENCE AND SERVICE TIME. THIS DATA WAS USED BY MAJ TOM CEDEL FOR ANALYSIS OF BOMBING SCORES.
1) HQTAC DOXB 804-764-3031/8/2944 2) Air Force Operations Resource Management Systems (AFORMS) 3) APR 171-180 VOL 8A (PMW) (C1) of 4 Nov 1986 AFORMS: ADZ/AQ Users Manual VOL 8MVOL 8A-OVERVIEW, VOL F INTERFACES	HQ TAC DOXB	A	TAC	NOW	1986-FREE	SSN, PAS, HIST. AND CURRENT FLIGHT INFO	X	X		O			H	PERF-BOGMWNG	INPUT TO HORB REPORT

* KEY:

Format
A. = Automated
PC = Personal Computer
HC = Hard Copy

Performance
O = Operational
M = Maintenance
MOS = Occupational

Objectivity
H = High
M = Medium
L = Low

A-4

TABLE A-2. CLASSIFICATION OF PERFORMANCE DATA (ARMY)

SERVICE	DATA HELD BY	FORMAT	WARFARE AREA	LEVEL	TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE	CREW PERFORMANCE	UNIT PERFORMANCE	OBJECTIVITY	RELATED DATA	REMARKS
ARMY															
1) Army Training Board Pt. Monroe/ AV 680-4350/4353															VARIOUS STUDIES
1) TRADOC/ARI LP ten - Steve Goldberg 804 727-3690/3640															VARIOUS STUDIES
1) Army Ballistic Research Laboratory Aberdeen Proving Ground															WEAPONS PERFORMANCE STUDIES
2) Army Unit Representation Analysis Model (Ariel)															
3) "Data were Data/" 202 274-482															
1) Army Training Support Center (ATSC) AV 927-4709/4107/4868															
INDIV TRNG EVAL DIV (ITED) 804 877-4441/3220/3043															
2) INDIVD TRNG EVAL PROG (ITEP) (a) Skill Qual Test (SQT) (b) Common Task Test (CTT) (c) Commanders Evaluation	MIL/PERCTR ITED/UNIT ITED/UNIT UNIT	A	ALL	INDIV		NAME, SSN MOS, UIC		X	X	O&M (MOS)			H H H	PERS-DMDC, MIL/PERCTR	TEST RESULTS USED BY PROMOTION BOARD AND FOR DECIDING TRAINING PLANS. ITED IS RESPONSIBLE FOR ANALYZING RESULTS AND ADVISING SCHOOL COMMANDS OF GENERAL DEFICIENCIES.
2b) BATT LEVEL TRNG MODEL (a) INDIV/CREW WEAP ANNUAL QUAL (b) Comb Arms Live Fire Exercise (c) Simulator Exercise	BATT ITED/UNIT AGGREGATED AT DIV	HC SOME PC	ALL	INDIV, WEAP SYS				X	X		O		M	PERS, TRNG, OPTE MPO	STRAC DERIVES TRNG STRATEGY IN TERMS OF ANNUAL PERS AMMO RESOURCE. THIS IS COMBINED WITH OPTEMPO AND UNIT CDR POL SPARE PARTS. STRAC SETS STANDARD AND UNIT CDR DETERMINES STRATEGY FOR MEETING STANDS WITHIN ALLOTTED RESOURCES.
3) DA CIRC 350-85-4															

* KEY:
Format:
A — Automated
PC — Personal Computer
HC — Hard Copy

Performance:
O — Operational
M — Maintenance
MOS — Occupational

Objectivity:
H — High
M — Medium
L — Low

A-5

TABLE A-2. (Con't.) CLASSIFICATION OF PERFORMANCE DATA (ARMY)

SERVICE	DATA HELD BY	FORMAT	WARFARE AREA	LEVEL	TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE	CREW PERFORMANCE	UNIT PERFORMANCE	OBJECTIVITY	RELATED DATA	REMARKS
1) CONTACT: AGENCY **2) DATABASE NAME:** **3) REFERENCE:**															
ARMY															
1) HQ Department of the Army DAMO-TRF 202-697-4107 DAMO-TRB 202-693-5635 2) Army Readiness Training End Program (ARTEP)	BATT	HC	ALL	SQUAD-BATT		UNIT TASKS	X						L	TRNG-BATT PERS-DMDC UNITREP-DAMO	ARTEP IS BASIS FOR ALL TRNG & PERF EVAL. DEGREE OF CONTROL OF CONTROL VARIES BUT IN GENERAL ENVIRONMENT IS VERY DIFFICULT TO CONTROL FOR. PURPOSES TRAINING SO EVEN IN EXTERNAL EVALS, TROOPS ARE BROUGHT BACK TO LIFE & ALLOWED TO REPEAT EVOLUTIONS. *EVAL BY BATT (INTERNAL) OR BRG (EXTERNAL)
1) Training & Doctrine Command (TRADOC) 4) Army Research Laboratory Jack Hiller 703 274-8915 Monterey Field Office Training Sys Perf Measures & Assessment Project AN Dr. Harvey Award 408 647-5919 D. Andrews 205 616-4565,6771 Dr. Howard McFann (Pvt Cons) b) National Training Center, Fort Irwin 4) Center for Army Lessons Learned (CALL) Ft. Leavenworth, Kansas AV 552-3035 Assessment Group 913 684-3035 2) Battalion/Brigade External Evaluation	API BATT/BRIG	VAR HC	ALL ALL	HQ/BRG PLT-BATT	UNK UNK		X			O	(CRM)		M	TRNG DATA-BATT, ITEP, STRAC, OPTEMPO PERS DAT DMDC	WORKING WITH NTC DATA. PART OF ARMY EFFORT TO IMPROVE DATA COLLECTION AND TO USE NTC DATA FOR PERFORMANCE MEASUREMENT. NTC IS DEDICATED TRAINING FACILITY AT FT. IRWIN CALIF. NTC IS AN INSTRUMENTED RANGE ON WHICH BRIGADE AND SMALLER SIZE UNITS CONDUCT EXTERNAL ARTEP EVALS. * SUBJECTIVE EVALUATION UNDER DIFFERING ENVIRONMENTAL CONDITIONS

KEY:

Format
A = Automated
PC = Personal Computer
HC = Hard Copy

Data
O = Operations
M = Maintenance
MOS = Occupational

Obtainable
H = High
M = Medium
L = Low

A-6

TABLE A-2. (Con't.) CLASSIFICATION OF PERFORMANCE DATA (ARMY)

A-7

TABLE A-3. CLASSIFICATION OF PERFORMANCE DATA (NAVY)

SERVICE 1) CONTACT: AGENCY 2) DATABASE NAME: 3) REFERENCE:	DATA HELD BY	FORMAT	WARFARE AREA	LEVEL	COVERAGE		DATA TYPES							RELATED DATA	REMARKS
					TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE	CREW PERFORMANCE	UNIT PERFORMANCE	OBJECTIVITY		
NAVY 1) Commander Surface Forces Atlantic ACB for Training Readiness Assessment 804-444-5357 2) Type Commander HDDTRS Info system (THAIS) AFTER I Jan 87 will keep track of: a) Competitive Exercises (Battles) b) Unit Status & Maintrly Reporting 3a) SURFLANTINST C3500.2D Chapt 7 of 5 Nov 1984 - Master Training Plan 3b) NWP10-1-11 of Feb 1985	TYPE CDR	A	ALL	SHIP SQDN	1 FEB 87 ON	AGGREGATE PERS, TRNG, EQUIP DATA			X			O	M	UNIT PERFORMANCE DATA	READINESS MEASUREMENT BASED ON CURRENT MATRIX WHICH CHANGES OVERTIME.
1) Space & Naval Warfare Systems Command a) (SPAWAR 312) 692-4599 b) COMSPAWARDEVCEN (402) 804-464-7735 2) Ship ASW Readiness/Effectiveness Measurement Program (SHAREM) 3) OPNAVINST 3560.20A of 6 Feb 1986	NUSC (Newport RI)	A	SURFACE ASW	SHIP, WEAP SYSTEM	1984-PRESENT DATA BASE BEING AUTOMATED		X	X				O	L	PERS-DMDC TRNG-UNIT READ-THIAS	EVALUATIONS BASED ON RECONSTRUCTION WHICH MAY BE OBJECTIVE PARTICULARLY RANGE DATA, ETC. NOT ALWAYS POSSIBLE TO CONTROL FOR ENVIRONMENT, AGE OF SHIP, PHASE OF TRNG CYCLE, ETC.

* KEY:
Format:
A - Automated
PC - Personal Computer
HC - Hard Copy

Performance:
T - Training
M - Maintenance
MOS - Occupational

Objectivity:
H - High
M - Medium
L - Low

TABLE A-3. (Con't.) CLASSIFICATION OF PERFORMANCE DATA (NAVY)

SERVICE 1) CONTACT: AGENCY 2) DATABASE NAME 3) REFERENCE	DATA HELD BY	FORMAT	WARFARE AREA	LEVEL	TIME PERIOD	COVERAGE — KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE	CREW PERFORMANCE	UNIT PERFORMANCE	OBJECTIVITY	RELATED DATA	REMARKS
1) Space & Naval Warfare Systems Command (SPAWAR 311) 202-692-0116 Planning Systems Inc (PSI) Deno Pistoli 703 739-5450 2) Integrated Reactions Analysis System (IRAS) 3) Reference Manual C	PSI	A	ASW AVIA (HS, VS, VP, ADW)	SQDRN, CREW (NO SSN)	07/01/84– PRESENT	CONTACT ACQUISITION AND WEAPS DATA					O		L-H	TRAINING DATA HELD BY SQDRN PERS DATA AVAIL FROM DMCC	INTENDED FOR RESEARCH COMMUNITY. INCLUDES FOREIGN CONTACTS AS WELL AS COMPUTER, MAJOR EXERCISES • EVALUATED BY CREW/AIR-RANGE
1) Space & Naval Warfare Systems Command (SPAWAR 312) 202-692-0480 (VITRO Inc. R. Dallenbergh 301 731-4715 2) Air Environment Measurement Program (AEM) 3) OPNAVINST 13380.1 of 28 May 86	VITRO	A AVIA TRNG SUPP SYS (ATIES)	ASW AVIA (NEW/VP/HS VP/HADW)	ASW CREWS	1984– PRESENT	CONTACT ACQUIS AND WEAPS DATA					O		L-H	TRAINING DATA HELD BY SQDRN PERS DATA AVAIL FROM DMCC CREW DATA FROM IRAS	EVALUATION OF WEAPONS SYSTEMS AND TACTICS RELATIVE TO DESIGN PARAMETERS AND EXPECTED PERFORMANCE NOTE: CREW DATA CAN BE OBTAINED BY CORRELATING WEAP DROP TIMES, ETC. WITH PURPLED IRAS • EVALUATED BY CREW/RANGERS NOTE: BATTLE GROUP EXERCISES REPORTING DATABASE CURRENTLY BEING DEVELOPED BY VITRO. EXERCISES BEGUN IN 1985 AND INCLUDE AAW. BY PAR 26 CHAPTER IS TO COMBINE AIRS, SHARED A SHARED DATABASES INTO ONE MASTER DATA BASE
1) NAVY/USMC SQDRN/Type Wing/Functional Wing/CNAL 804-444-3018 2) Maintenance Training Improvement Program (MTP) 2a) CNAL/NST 1510.25 of 29 Mar 1986 2b) OPNAVINST 4790.2C CH1 1 Oct 1986	SQDRNS	A	AVIA (VFHA VFHG VFHS NSWS HC/ADW)	SQDRNS	1-2 YEARS	DATA CAN BE RETRIEVED BY INDIVID SQDRN, TYPE AIC, SYSTEM, ETC.	X	X		M			H	3M MART PERFORMANCE DMCC PERS DATA	DESIGNED TO RELATED TRAINING TO PERFORMANCE AND TO MAKE RESULTS AVAILABLE AT ALL LEVELS FROM SQDRN TO TYPE COM AT APPROPRIATE LEVEL OF DETAIL. USMCID GETTING AT 3RD TERMINAL. ATEN WILL PUT MTP, MATMEP, 3M, OPTC DATA ON SAME COMPUTER SYSTEM
1) Allied Wings Atlantic (804) 772-3321 2) Operational Training Improvement Program (OTIP)	AIR WINGS		ALL AVIA	SQDRN, WING	1987		X	X		O			H		OTIP IS BEING DEVELOPED BY AIR WINGS WING PATTERNED AFTER MTP

NOTE:
Band:
A – Automated
PC – Personal Computer
HC – Hard Copy

Estimates:
O – Objective
M – Maximum
MOS – Occupational

Objective:
H – High
M – Medium
L – Low

SERVICE	DATA HELD BY	FORMAT	WARFARE AREA	LEVEL	TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE	CREW PERFORMANCE	UNIT PERFORMANCE	OBJECTIVITY	RELATED DATA	REMARKS

SERVICE	1) CONTACT: AGENCY 2) DATABASE NAME 3) REFERENCE	DATA HELD BY	FORMAT	WARFARE AREA	LEVEL	TIME PERIOD	COVERAGE KEY FIELDS	PERSONAL CHARACTERISTICS	GENERAL INDIVIDUAL	GENERAL UNIT	PERSONAL PERFORMANCE INDIVIDUAL	PERSONAL PERFORMANCE MEMO	UNIT PERFORMANCE	OBJECTIVITY	RELATED DATA	REMARKS
NAVY/USMC	1) Navy Maintenance Support Office (NAMSO) P.O. Box 2060 Mechanicsburg, PA 17055 AV 430-2591 2) Maintenance Material Management 3-M Machine Database 3) OPNAVINST 4790.2D Naval Aviation Maintenance Program	NAMSO	A	ALL NAVY USMC AVIA	3O/INI	1972-PRES	READINESS UTILIZATION MAINTAIN- ABILITY					H	H	H	TRMS-MTP PMS-DASC OPS-DASC	3-M IS COMPREHENSIVE FLIGHT PERFORMANCE DATA BASE WHICH CAN BE CORRELATED WITH FLIGHT AND OPERATING DATA AS WELL AS MAINTENANCE TRENDS. "DATA KEPT BY AIRCRAFT SYSTEM
	1) OPNAV (OP-41ET) PNT EC394 DEPARTMENT OF THE NAVY WASHINGTON DC 20350 Navy Center AV 664-7596 2) Naval Flight Information Planning System (NAVFLIPS) 3) OPNAVINST 3710.7L CH1 25 Aug 85 NATOPS GEN FLT & Operating Inst	NAMSO	A	ALL NAVY USMC AVIA	3O/INI	1 JAN 67- PRES	FLIGHT HOURS, ORD DEL SCORE, TYPE STL DATA, QUAL DATA		X	X	O	O		3/H	PERF-DODPR, PERS-DASC	PREVIOUSLY PILOT DATA WENT TO SEPT CENTER, AIRFRAME DATA TO NAMSO FOR INCLUSION IN 3-M DATA BASE, AND LOGISTICS TO NEW ORLEANS. NAPLRS COLLECTS ALL OF THESE DATA PLUS TYPES AND SYLLABUS DATA AND SENDS TO NAMSO. NAMSO THEN IS CENTRAL SOURCE FOR OTHER AGENCIES.

KEY:
Format
A = Automated
PC = Personal Computer
HC = Hard Copy

Database
O = Organizational
M = Minimum
MOS = Occupational

Objectivity
H = High
M = Medium
L = Low

TABLE A-4. CLASSIFICATION OF PERFORMANCE DATA (USMC)

PERFORM C

SERVICE	DATA HELD BY	FORMAT	WARFARE AREA (a)	LEVEL	TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE (a)	CREW PERFORMANCE	UNIT PERFORMANCE	OBJECTIVITY (a)	RELATED DATA (a)	REMARKS
1) HQ USMC DC/S for Training Collective Standards & Evaluation 694-5030 2) Marine Corps Readiness Eval System (MCCRES) 3) USMC Order 3501.1	NEXT HIGHER ECHELON & UNIT EVALUATED	HC, PC	ALL	SQUAD-BATT	UNK	MISSION ELEMENTS EACH TASK BROKEN DOWN TO QUESTION ANSWERABLE BY YES/NO	X	X	X	O	O	O	L-M	TRNG RECS HELD BY BATT/COMPANY PETS DATA HELD BY BATT AND DMDC ADMAT HELD SEPARATELY	SELF EVALUATIONS AT DISCRETION OF UNIT CDR - INTENDED AS TOOL TO ASSIST IN PLANNING TRAINING PROGRAM. EXTERNAL EVALUATION CONDUCTED AT LEAST EVERY TWO YEARS. SOME ANALYTIC WORK CONDUCTED BY DR. BILL MARLOW AT GMU AND OTHERS 691-3030/MAJ CONDRA (AVIATION) 694-3447 *1) UNIT IS EVALUATED AGAINST DOCTRINE *2) EVALUATED SUBJECTIVELY AND AGAINST STANDARDS
USMC 1) HQ USMC DC/S Training (Aviation TRNG And IS Design Section) 694-3447 2) Aviation Training & Readiness Information Mgmt System (ATRIMS)	SCORRS	A, PC (GFM, MCHN)	AVIA	INDIV AVIATOR, AIRCREW	ONE MO. MONTHLY HC RPTS KEPT FOR UNSPEC'D PERIOD	OFF. NAME & SSN. GRD SCORES FOR 3 TO 4 MONTHS	X	X	X			O	M		ATRIMS COMPUTER SYSTEM TRACKS INDIVIDUAL AND CO CAN LOOK AT SCORN AT SQDRN LEVEL. CANNOT BE ACCESSED BY ANY OTHER LEVEL ATRIMS ALSO USED IN UMITREP (SORTS) REPORTS
3) AV TRNG & READ MANUAL VOL 1 MC Order P3500.14A Jan 85 1) Dep C/S Installations and Logistics, Integrated Logistics Support Office (ILSO) (202) 695-0405 2) Marine Corps Integrated Maintenance Management System (MIMMS) 3) MC ORDER P4790.2B MIMMS Field Procedures Manual 24 Jan 83 MIMMS UM 4790-5 MIMMS User Manual 1985 PERSTRNG	DC/S I&L ILSO REGIONAL DATA PROC UNITS (CPL, PENDELTON, LEJEUNE, ALBANY, GA) BATT	A	GRND	BATT	HELD FOR 15 MOS	EQUIPMENT NUMBER & MANUFACTURE						M	M	PETS/TRNG DMDC, OPERATING SCHEDULES	RECORDS KEPT BY PART NUMBER & MANUFACTURER VICE PERSONNEL.

* KEY:

Format
A — Automated
PC — Personal Computer
HC — Hard Copy

Performance
O — Combat
M — Maintenance
MOS — Occupational

Objectivity
H — High
M — Medium
L — Low

PERSTEMS

TABLE A-8. CLASSIFIRCATION OF PERFORMANCE DATA (USAF)

SERVICE	DATA HELD BY	FORMAT	WARFARE AREA (a)	LEVEL	TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE (b)	CREW PERFORMANCE (b)	UNIT PERFORMANCE (b)	OBJECTIVITY (c)	RELATED DATA	REMARKS
USAF															
1) CONTACT: AGENCY HOTAC Deputy Operations for Analysis AV 574-STEM/604-784-5705															
2) DATABASE NAME: GUNSMOKE	DOA TAC	A	A/A, A/G	CREW	1985	A/G SCORES A/C TYPE				o	o		H	TRNG & EDP DATA COLL AT MEET, HORS	TRNG AND PERS DATA IS ALSO AVAILABLE FROM HORS DB. GUNSMOKE IS A TOP GUN TYPE COMPET SO NOT REPRESENTATIVE. LOADING AND MAINT CREW COMPET ALSO CONDUCTED BUT SCORED BASED HEAVILY ON APPEARANCE/PROCEDURES
3) REFERENCE: GUNSMOKE 1985 Statistical Summary and Lessons Learned, DOA Technical Report 84-2, Mar 86															
2) WILLIAM TELL	DOA TAC	HC, PC	A/G	CREW		NAME, RANGE SCORE, A/C TYPE				o	o		H	TRNG, EDP-HORS	ALSO A TOP GUN TYPE COMPETITION
1) Nellis AFB AV 682-4777, MED Greenhalgh XSTR2															
2) RED FLAG (AIR TO OPN)/GREEN FLAG (RD4)	WING	HC	TAC	CREW, SQD/WING WING		NAME, RANGE SCORE, TYPE, A/C				o	o		H	TRNG, EDP-HORS PERS-SQD/WING	WING EVOLUTION. REPEATED AT 3 YEAR INTERV. IF POSSIBLE BUT USUALLY LONGER. MUCH THE SAME PROBLEM AS DAILY OPERATIONS. NEED DATA FROM SQDRN TO MATCH TRNG, & PERFORMANCE

KEY:

Format:
A - Automated
PC - Personal Computer
HC - Hard Copy

Performance:
O - Operations
M - Maintenance
MOS - Occupational

Objectivity:
H - High
M - Medium
L - Low

A-13

SERVICE	DATA HELD BY	FORMAT	WARFARE AREA	LEVEL	COVERAGE — TIME PERIOD	COVERAGE — KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE	CREW PERFORMANCE	UNIT PERFORMANCE	OBJECTIVITY	RELATED DATA	REMARKS
1) CONTACT: AGENCY / **2) DATABASE NAME** / **3) REFERENCE**															
1) USAF TAC Wing Langley AFB, Virginia															
1 TRM/DOT															
2) Self Initiated Operational Readiness Inspection (SIOR)															SIOR IS PRACTICE FOR THE MAJCOM ADMINISTERED OR. PHASE I IS PRIMARILY MAINT AND LOGISTIC. PHASE II IS OPERATIONS. DATA SUCH AS GUN CAMERA FILM AND GRADE SHEETS NOT REQUIRED TO BE KEPT FOR ANY SPECIFIED TIME.
Phase I-Deployment (1 Turn-Around)	WING	HC	ALL	WING/SODRN		LOGAMAINT, COAM		X				O&M	L		
Phase II-Assume In Theater Posd Plan & Execute Ops	WING	HC	ALL	WING/SODRN		COAM, TAC, OPS		X				O	L		
2) TAC REG 123-1 (Grading Criteria)															
2) STAN EVAL	WING/SODRN	VARIES HC OR PC	ALL	CREW		FLIGHT EXERCISE (ORD, ECM, ET, ETC.) INCL QUALS	X					O	H	PERS INCL PLT - TRNG - SODRN	STAN EVALS ARE COMPREHENSIVE EVALUATIONS OF OVERALL AIRMANSHIP AND OPERATIONAL ABILITY. EVAL IS AT WING LEVEL. DATA MAINTAINED AT SODRN LEVEL.
2) TAC Training/Source Reports															DAILY FLIGHT AND TRAINING DATA IS SUMMARIZED AT THE SODRN LEVEL ONLY. FORM 205 IS AN AFORMS REPORT. IN ADDITION TO ABOVE TAC FORMS, QUALIFICATIONS ARE RECORDED IN TRNG JACKETS USING VARIOUS AF FORMS. TRNG JACKETS ARE MAINTAINED BY SODRN AND GO WITH INDIVIDUALS WHEN TRANSFERRED.
Form 57 (Monthly Flying Accomp)	SODRN	HC	ALL	INDIV			X					O	H	STAN EVAL, HORS	
Form 107 (Indiv Ground Trng)	SODRN	HC	ALL	INDIV			X						H	STAN EVAL, HORS	
Form 154 (Wng Data Sortie Record)	SODRN	HC	ALL	CREW			X					O	H	STAN EVAL, HORS	
Form 205 (Indiv Flight Score)	SODRN	HC	ALL	INDIV								O	H	STAN EVAL, HORS	
TAC Form 328 (AFORMS PERS TRNG FORM (AFR 60-150/TAC SUP 1))	SODRN	A	ALL	CREW			X					O	H	STAN EVAL-ORDNANCE SCORES	ALL MAJOR COMMANDS HAVE SIMILAR RECORDS BUT THERE ARE NOT STANDARDIZED EXCEPT FOR AF FORMS.
3) TACM 51-50 VOL1 CHAP 611 JUN 85															
2) TOP GUN Evaluation	WING	HC	ALL	CREW								O	H	STAN EVAL-HORS	

a. KEY:

Format
A - Automated
PC - Personal Computer
HC - Hard Copy

Performance
O = Operations
M = Maintenance
MOS = Occupational

Objectivity
H = High
M = Medium
L = Low

TABLE A-5. (Cont.) CLASSIFICATION OF PERFORMANCE DATA (USAF)

SERVICE 1) CONTACT: AGENCY 2) DATABASE NAME 3) REFERENCE	DATA HELD BY	FORMAT	WARFARE AREA (a)	LEVEL	TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE	CREW PERFORMANCE	UNIT PERFORMANCE	OBJECTIVITY (4)	RELATED DATA	REMARKS
1) TAC DPR LGR(TAC/LG) Langley AFB 2) TAC Monthly Maintenance Summary	TAC LGR	A	ALL	WING	1991-PRESENT	UTIL & SCHED EFFECT RATE, TIME DOWN, CANNIB	X					M	H	PERS TRNG-WING OUT-WING LG PERS DATA-DMDC	DATA INTENDED FOR COMPARISON OF TRENDS IN AGGREGATED PERFORMANCE INDICATORS AMONG WING AND HIGHER UNITS.
1) Wing LGR (Maintenance Analysis Section One Tactical Fighter Wing (1 TFW) 804-764-3510 2) CAM System (Daily Status, Flying & Performance Report)	WING LGM	A	ALL	FLIGHT & MAINT SQDRN RON		UTE, MC DAT SORTIES, ABORTS, REPEATS, CANNIB, BRK/FIX RATES	X	X				M	UNK	TRNG DATA-RODPWING	SIMILAR TO 3M SYSTEM BUT APPEARS TO BE LESS COMPREHENSIVE INPUT TO TAC CAM SYSTEM
2B) Maint Training Jacket	WING LGM	HC	UNK	SQUAD RON/WDIV		OUT, TASK REQUIREMENTS	X	X	X				UNK	UNIT MAINT PER PERS DATA-DMDC	
1) TAC Inspector General (IG) AV 574-3510/5325 2B) Management Effectiveness Insp. (MEI)	TAC IG	HC	ALL	WING&SQDRN RON		ADMIN	X	X	X			O&M	L	WING TRNG/PERF AND PERS DATA	THIS IS AN ADMINISTRATIVE INSPECTION. UNITS MEASURED AGAINST DOCTRINE. FIVE GRADES (UNSAT, MARG, SAT, EXC, OUTSTAND) IG APPEARS TO BE TOUGH GRADER
2B) Operational Readiness Insp. (ORI) 3) Air Force Regulation 123-1	TAC IG	HC	ALL	WING&SQDRN RON		DEPLOYMENT/ OPS/COMM/MAINT	X	X	X		O	O	L		RESULTS PUBLISHED AS ONE OF FIVE GRADES FOR EACH GRADED AREA. DIFFICULTY IN CONTROLLING FOR ENVIRONMENT (WX, QUALITY OF OPPOSING FORCE, ETC)
USAF Operational Data (Strategic Air Command) 1) First Combat Evaluation Group (1 CEVG) OFFUT AFB, NE 68113-5001 2) Bomb/STRAM/STRAM-Envld a) Daily Training Score b) Operational Readiness Inspection 3) 1CEVGR 55-6, VOL I, 9 OCT 1986	1CEVG	A MINI COMP. PC	SAC	CREW	ECM AUG 85 BOMB/SRAM JUN 86 HC TO 1978	BOMB/SRAM/ECM SCORES CREW NMBR SPECIFIED NO NAMES OR SSN IN DATA BASE					O	O	H	HOSE TRNG-WING MAINT-WING PERS-DMDC FLT SCHED SQDRN	ALL DATA BEING TRANSFERRED TO PC CREWS CHANGE APPROX 3 MOS ACTUAL CREW MBRS NOT SPECIFIED ON DATA FORM BUT SPACE EXISTS AND COULD BE REQUIRED. WOULD HAVE TO GET EXACT CM-SORTRY MATCH FROM SQDRN CURRENTLY. * USE RADAR BOMB SCORING SYST FOR COMPLETE DAILY TRNG AND ORI

KEY:
Format
A = Automated
PC = Personal Computer
HC = Hard Copy

Reference
O = ... tions
M = Maintenance
MOS = Occupational

Objectivity
H = High
M = Medium
L = Low

TABLE A-5. (Con't.) CLASSIFICATION OF PERFORMANCE DATA (USAF)

SERVICE	DATA HELD BY	FORMAT	WARFARE AREA [a]	LEVEL	COVERAGE			DATA TYPES						OBJECTIVITY [a]	RELATED DATA	REMARKS
					TIME PERIOD	KEY FIELDS	PERSONAL CHARACTERISTICS	INDIVIDUAL TRAINING	UNIT TRAINING	INDIVIDUAL PERFORMANCE [a]	CREW PERFORMANCE [a]	UNIT PERFORMANCE [a]				VARIOUS STUDIES OF SIMULATORS, TACTICS AND EQUIPMENT PERFORMANCE

1) CONTACT: AGENCY
2) DATABASE NAME:
3) REFERENCE:

1) Air Force Human Resources Laboratory (AFHRL/OT) Williams AFB
Dr. Bob Nullmeyer AV 474-6561
2) Data bases from current and past studies

* KEY:

Format
A - Automated
PC - Personal Computer
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Performance
O - Operations
M - Maintenance
MOS - Occupational

Objective
H - High
M - Medium
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A-16

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